HOW LONG SHOULD YOUR VALVES LAST?

PERCY HARRIS'S MAINS UNIT FOR ANY SET

Amateur Wireless and Radiovision

Every Thursday 3d

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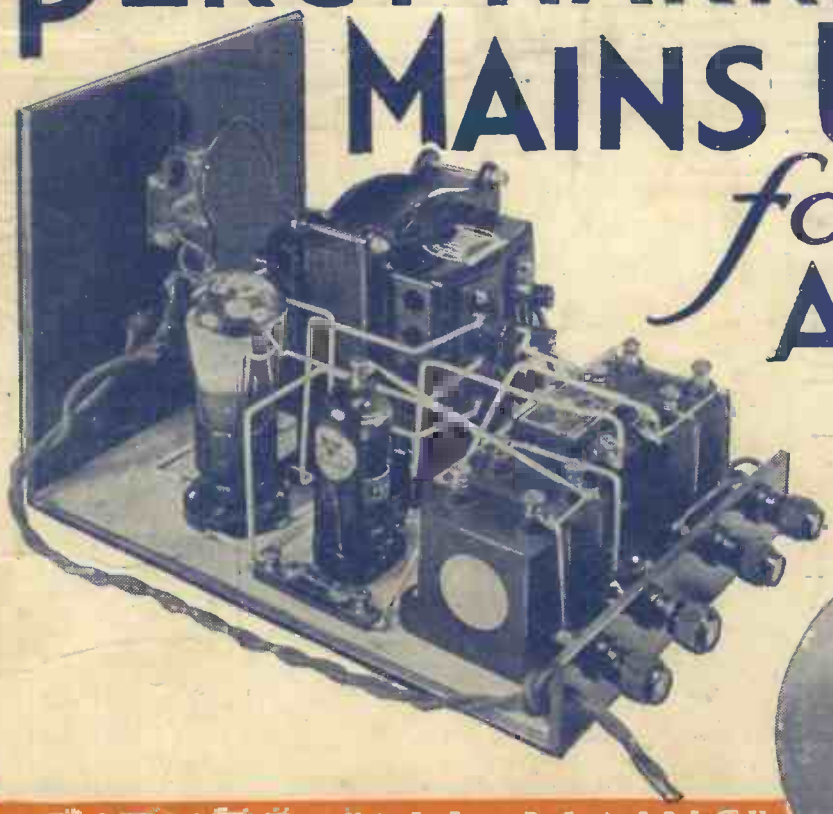

EITHER "ALL MAINS" OR "H.T. ONLY"

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Amateur Wireless & Radiovision

BRITAIN'S LEADING RADIO WEEKLY
FOR CONSTRUCTOR, LISTENER & EXPERIMENTER

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NEWS & GOSSIP OF THE WEEK

"PORTABLE" WEATHER

THE Clerk of the Weather seems to have decreed that, for a few weeks at any rate, we are to have weather suitable for portable sets out of doors! The sudden spell of fine weather may have reminded you that you have no suitable set to take out into the open. Well, a new "A.W." portable set is being described next week. Don't miss it. It is ideal for indoor or outdoor working.

THE SCHOOLS BROADCASTS

THE Schools Broadcasts officials are getting busy again and the Central Council for school broadcasting has been reconstituted under the chairmanship of Lord Eustace Percy. The idea is that the Council will draw up a long programme as a guide for the Schools Department of the B.B.C. Sir John is taking an active interest.

HOW THEY WRITE

Not Too Many Grumbles!

THE B.B.C. is busy on its postbag in connection with Scottish Regional. It seems that forty-six per cent. of the correspondents are getting satisfactory reception, while only 6.4 per cent. are experiencing trouble. Reports from outside the service area total 35.7 per cent., which augurs well for Falkirk's power. Only one per cent. of the letters are requests to visit Falkirk, which shows that the dour Scots temperament has not yet been shaken by the new broadcasting conditions.

THE "KING" OF JAZZ

Which is the Most Popular?

SOME of the recent comers among dance bands which broadcast are showing such "finish" that they are proving worthy rivals of the old-established combinations, which have had things more or less their own way for some years past. Ambrose revolutionised the dance music from the Dorchester Hotel; Maurice Winnick did a similar service at the Carlton; and Roy Fox gave listeners something new from Monseigneur. With Henry Hall presiding over the B.B.C.'s own dance music from Broadcasting House BA studio, this phase of entertainment seems to be growing more virile than ever.

UP MONT BLANC

Taking a Microphone

FRENCH outside broadcasts engineers are making another attempt to follow an ascent of Mont Blanc with a microphone and portable amplifier. Last year, when an unsuccessful attempt at an ascent was made, the broadcast gear broke down. This year they are taking no chances and a short-wave transmitter is being carried with the mountaineering party. A short-wave super-het. at the base station will link up by landline with Lyons so that the O.B. can be broadcast.

HENRY HALL'S FIRST VIOLIN

CYRIL HELLIER, the newcomer to Henry Hall's band, has made good as first violin. He ought to be good—he was with Jack Hylton's band for several years, and is a soloist of experience. Henry Hall intends to arrange for special orchestrations to emphasise this player's talent as a soloist.

A POSTPONED CEREMONY

IT is expected that the Prince of Wales will unveil the memorial at Thiepval on August Bank Holiday, and O.B. engineers will go over with mikes and amplifiers to carry out the job. It will be recalled that the ceremony was postponed owing to the tragic death of M. Doumer, who was to have been present at the unveiling fixed for last Whit Monday. The customs officials are now familiar with the O.B. gear, but in the early days a lot of trouble was caused by the curiosity of the officials, who wanted either to confiscate the apparatus, or to take it to bits!

NEW RADIO POLICE!

The new wavelength-checking station on the roof of the Reichspost station at Tempelhof in Germany. The operators are seen working on the special wavemeters

NEXT WEEK: A GOOD 4-VALVE PORTABLE FOR INDOOR OR OUTDOOR USE

NEWS & GOSSIP OF THE WEEK—*Continued*

ATTACKING AN AIR RECORD

THERE are to be busy wireless scenes at Hanworth when the Hon. Mrs. Victor Bruce attacks the duration (re-fuelling) record in the air. She is taking vital wireless gear up in her British plane, and hopes to be in the air for about four weeks! A transmitter in a van is being used to keep up regular communication.

STRAIGHT FROM EGYPT!

More Talkative Than The Sphinx

THE new Anglo-Egyptian telephone service was used when the relay was attempted last week between the Egyptian Minister of Communications in Cairo, the Egyptian Prime Minister, and Mr. Stanley Baldwin and the Postmaster General in London. Not a bad test for the new long-distance radio-telephone service. Rugby and the super-hets. at Baldock were used, of course.

BY LINE

AND, talking of long-distance relays, the B.B.C. is making more frequent use now of the Continental line through to the German Broadcasting House. The *Samson and Delilah* broadcast last week was from the Municipal Opera House at Charlottenburg, the suburb of Berlin in which is the Broadcasting House and the central control point for the relay. B.B.C. engineers worked with the German R.R.G. landline experts.

NEW GERMAN STATIONS

WE hear that the new plant has already been ordered for Munich and in about three months the power will go up. It may be necessary to shift the wavelength, just as the new Leipzig and Frankfurt stations have had to "swap" their positions in the ether. The higher power from Munich will make a big difference to the German Regional scheme.

FILM TECHNIQUE

ADRIAN BRUNEL, playwright, film producer, journalist and broadcaster, has written a comedy sketch entitled *Good Morning, Boys*, which will be given in a forthcoming London Regional vaudeville programme. Brunel was responsible for the first British "talkie," *Elstree Calling*, and *The Constant Nymph* film. His microphone adaptation of his own stage play, *Till To-morrow*, was one of the B.B.C.'s recent successes. Apparently film technique helps in getting the right kind of stuff for the "mike," especially now that "talkies" are here.

BROADCAST AGAIN

NORTHERN engineers are looking out for interesting outside broadcasts, and for the third year in succession the quaint Tynwald Ceremony will be made available to North Regional listeners by means of a running commentary on July 5. The Tynwald is the Parliament of the Isle of Man and has a continuous history of nearly a thousand years. It is only exceeded in antiquity among the Parliaments of Europe by the Icelandic assembly known as Althing.

"INVESTIGATION" IN SCOTLAND

APPARENTLY the discussion about Scottish broadcasting has not ended with the deputation to Sir John Reith. We hear that Mr. David Kirkwood, the member for Dumbarton, is taking matters up with the Secretary of State for Scotland. What he is particularly interested in is the dispute between Mr. Cleghorn Thomson and musical bodies about the broadcasting of concerts of the Scottish Orchestra. Mr. Kirkwood wants a Scottish Board of Directors!

ABRA-KADABRA!

JASPER MASKELYNE, the magician of Maskelyne and Devant fame, is writing a revue entitled *Magic in the Air* specially for broadcasting! It will be heard some time next month. Mr. Maskelyne will have the assistance of Mr. John Macdonell in the production of the revue, so the B.B.C. is not going to let Mr. Maskelyne have it all his own way in making the ether vanish!

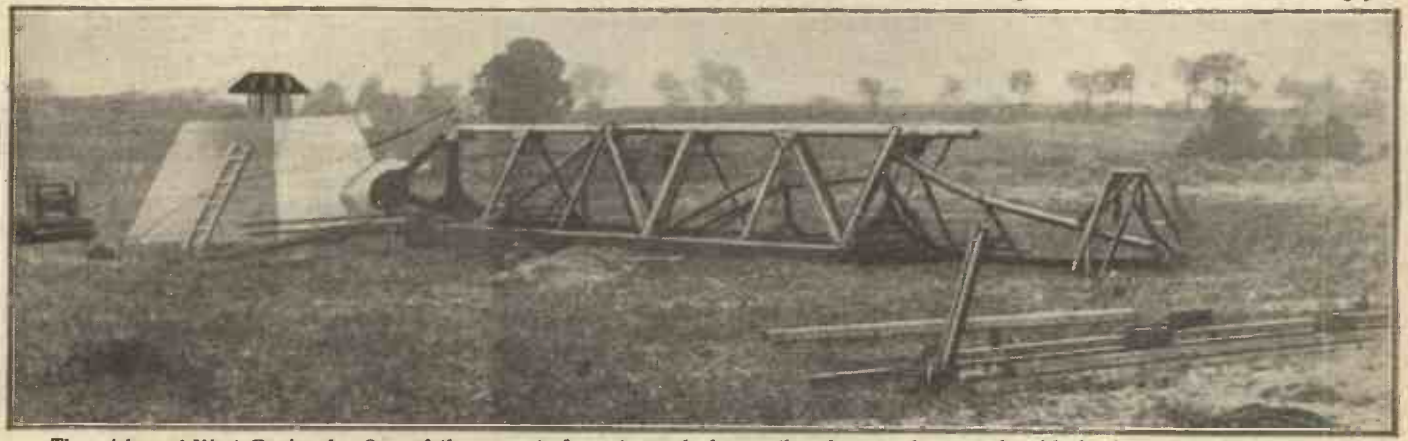
PROGRESS AT WEST REGIONAL

THINGS are going smoothly at Washford Cross, after the aerial mast tragedy, the result of which is depicted in the photograph on this page. The engineers have been told that the building will be ready in all probability by September.

Looking down towards Broadcasting House. The famous All Soul's Church is in the foreground, and the first relayed Service from here was broadcast last week, the Broadcasting House control room being used

ECHO WANTED!

LISTENERS have complained recently of the lack of echo on some transmissions from the new London studios. It appears that while the reverberation periods of the studios are fine for the performance, a little additional echo on transmissions is sometimes needed from the listeners' point of view. Are the Broadcasting House echo-rooms working yet?



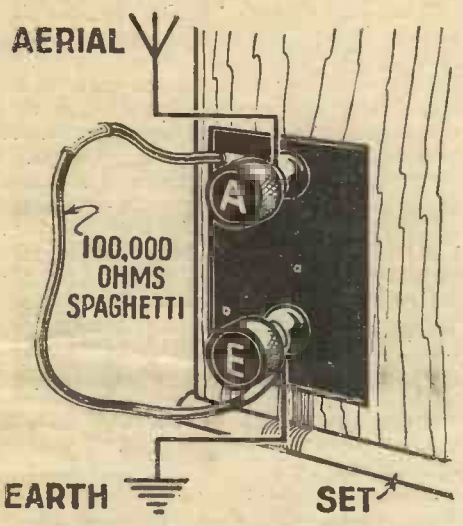
The mishap at West Regional. One of the new steel masts crashed recently when partly erected, with fatal results. The supports broke and it collapsed from the huge insulating base, killing one man and injuring two

PLAIN FACTS ABOUT ATMOSPHERICS

This is the season when atmospherics are apt to be troublesome, and all listeners will therefore be interested in this topical article, wherein the causes and partial cures of the trouble are simply explained.

IN this country the bug-bear of atmospherics seldom makes wireless reception impossible, though in many countries there are months in the year when everything is blotted out by these annoying grinding and crashing noises.

Probably the peak month of atmospheric disturbance in this country is July, and



This diagram shows how a high resistance, which may be of the spaghetti flexible type, can be shunted across the aerial and earth terminals of the set to cut down severe atmospheric discharges

the trouble is accentuated in very hot weather. Many readers write in to know how they can cut down atmospherics, thereby showing that the exact nature of the phenomenen is not clearly understood.

Atmospherics are caused by lightning discharges in the atmosphere, or by the gradual equalising of potential between charged clouds or a cloud and the earth.

Two important facts should be noted. For one thing, these atmospherics have no particular frequency. So they cannot be tuned out by ordinary means, no matter how many circuits are employed. Secondly, and this is important, the atmospherics may be many times more powerful than a distant station, so when conditions are bad it is useless to introduce very much amplification, for this means that the atmospherics are amplified *in the same ratio* as the required signal, and the result is unbearable.

Sometimes you may be in doubt as to what is causing the background noises in the set—it may be atmospherics or it may be a running-down battery. To prove this point, disconnect the aerial and earth. If the trouble stops you may then take it that atmospherics are the cause.

One of the first facts the listener discovers about atmospherics is that, no matter how carefully the set is tuned, they still persist in coming through, though with diminishing intensity as the wavelength is decreased.

The aperiodic nature of atmospherics makes it very difficult, if not impossible, to eliminate them. They affect the tuning circuits of the set by what is known as shock excitation.

It is generally agreed that if a sufficiently powerful signal is applied to a tuning circuit it will oscillate at its resonant frequency—at the frequency to which its inductance and capacity tune. This will happen, note, at *any* incoming frequency, so long as the energy is sufficiently powerful.

An illustration may help. If you have a tuning fork of a certain pitch or frequency it will vibrate at that frequency when a near-by piano produces a note of that frequency. Any other note may be struck on the piano without affecting the tuning fork.

Shock Effects

But now supposing you hit the fork with a hammer—it will be set into vibration at its pitch or frequency, in spite of the fact that the hammer has no particular frequency. It is shock excited, and in a similar way atmospherics, of no special frequency, but of considerable amplitude, will set a tuning circuit into oscillation at its resonant frequency—and then, of course, the noise is amplified by the valves and heard in the loud-speaker.

Scientists and engineers have tried for years—ever since wireless began—to get rid of atmospherics, but without any real success. Various ideas have been tried out, but usually they are so complicated, and involve so much waste of energy, that the average amateur would dismiss them as impracticable.

Of the several ways of cutting down the intensity of atmospherics, probably the most useful is to alter the aerial. A long, high aerial seems to pick up atmospherics much more easily than a low aerial.

But we must tread warily here. For if the aerial is lowered its signal pick-up efficiency will be reduced, and that means more amplification for a distant station. The extra amplification might well bring up the atmospherics to unbearable level, and all the aerial alterations would be so much waste of time.

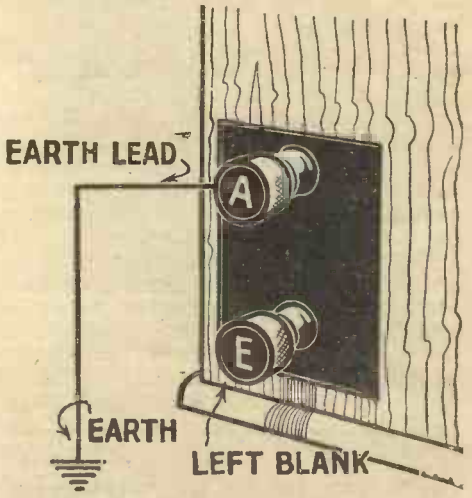
Let us put it this way. If the required incoming signals can still be heard at good strength on the lowered aerial, that is, without adding to the amplification, then the *ratio* of signal to atmospherics will have been increased, and the effect will be a reduction of the interference.

Cutting Out Atmospherics

Bearing this argument in mind, you will see that under certain conditions a frame aerial will also help to cut down atmospherics, always provided that excessive amplification does not follow.

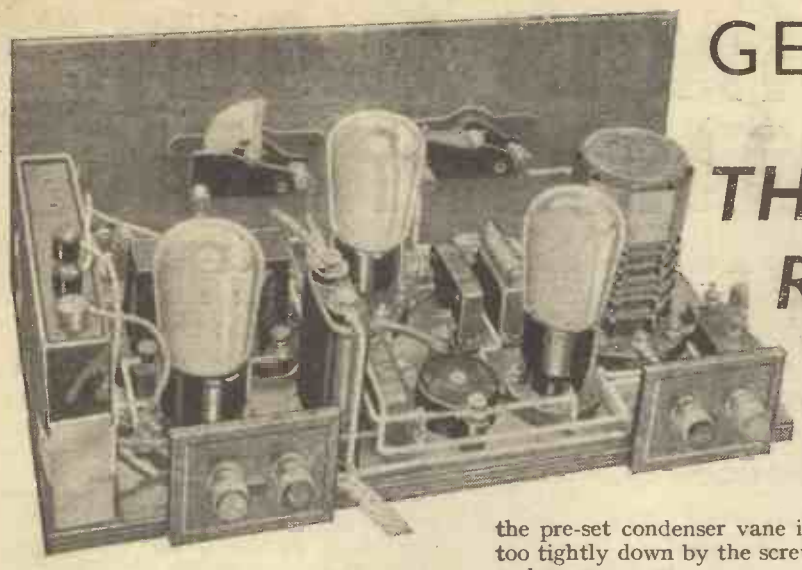
Another stunt is the connection of a fairly high resistance across the aerial-tuning circuit, to act as a drain for the static discharges. Nothing much lower than 100,000 ohms should be used, otherwise the signal strength will be impaired.

Buried aerials are sometimes recommended as a method of cutting down



By disconnecting the normal aerial and connecting the earth lead to the aerial terminal of the set, as shown here, atmospherics can often be eliminated, and reception of the local can be enjoyed even when conditions are very bad

atmospherics, but of course the signal strength is greatly reduced also. It is often worth trying the earth as an aerial, and leaving the earth connection blank. This reduces the average set to local-station range, but often completely cuts out the atmospheric disturbance.



GETTING RESULTS WITH THE NEW REGIONAL THREE

Listeners in B.B.C. Regional areas will be interested in this further description of a three-valver which is designed for good quality reception. First details of this easy-to-build set were given last week

THE "New Regional Three" is a most simple set to control, so that detailed description of the operation is unnecessary. This is one of the many points which justify its title of "Regional." Before the batteries are connected and the valves inserted, though, it is advisable to check over all the wiring to make sure that there are no short circuits.

It was recommended in the constructional article last week that the square corner system of wiring should be adopted as this makes for neater connections in the present set. This means that not only have you to check over the positions of the wires, but it is advisable to test the connections at each soldered joint to make sure that a wire which appears to make good contact with a terminal or spade tag actually does so and is not prevented from making electrical contact with the other metal surface because of a thin layer of flux. This applies not only to the rigid-wire leads, but to the flexibles.

Do not twist the high-tension and low-tension groups of wires before attaching wander plugs and spade tags respectively. The number of flexibles is cut down to a minimum as there is only one high-tension tapping for the whole set.

Solid di-electric condensers are used for tuning so the usual precaution of making sure that the vanes do not touch is unnecessary. It is advisable, though, to see that there are no short-circuits anywhere else, that the wander plugs make good contact in the battery sockets, that the pre-set condenser vane is not jammed too tightly down by the screw adjustment, and so on.

When these details have been attended to you can get ready for a first test. The valves need careful choosing. A selection of suitable two-volt valves is given in the accompanying table and from these you will be able to make your choice. If, for any reason, you use 4- or 6-volt valves, then equivalent types should be chosen.

SUITABLE VALVES FOR THE "NEW REGIONAL THREE"

Make	Detecter	L.F.	Power
Mullard ...	PM1HL	PM2DX	PM2A
Marconi	HL210	L210	L 2
Osram ...	HL210	L210	LP2
Mazda ...	HL219	HL210	P220
Cossor ...	210HL	210LF	220PA
Six-Sixty	210HL	210D	220P
Lissen ...	HL2	L2	LP2

If the set is to be operated from batteries, then a double- or triple-capacity 120-volt job should be used. The H.T. consumption of the "New Regional Three" is low, but a standard capacity battery will not give anything like the life of a double- or triple-capacity job on a three-valve H.T. current drain. A 9-volt grid-bias battery should be fitted in the clips on the baseboard and the connections made as shown.

The set can take its high-tension from the mains, if a unit such as the Atlas A.C.244 is used, or one of the equivalent types by Ekco, Tannoy, Lissen or Regentone, for example.

Provided the set is worked not too far out of the Regional service area an indoor aerial can be used if it is not convenient to erect an outdoor wire, but as there is no high-frequency amplification in the set, exceptional range cannot be expected. A good earth is an advantage in any case.

The operation is extremely easy. Screw down the knob of the pre-set condenser so that the value is at maximum and turn the knob of the reaction condenser backwards and forwards, making sure that the set goes gently in and out of oscillation. The anode resistance and anti-motor-boating resistance are so chosen that if a good detector valve is used, its anode voltage will be just right for smooth reaction. No other variation of the high-tension voltage is possible or necessary.

Turn the main tuning condenser until one of the local stations is picked up. You will probably find that slacking off the knob of the pre-set condenser sharpens the tuning by an appreciable amount, without cutting down the volume.

You should in every case be able to get a clear background between the local, National and Regional transmitters. Adjustment of the grid-bias voltages may be necessary to get the tone right and cut down the high-tension consumption. This point is particularly important when working from batteries as a slight increase in the bias voltage may cut down the high-tension current without impairing the tone.

COMPONENTS FOR THE "NEW REGIONAL THREE"

Three-ply panel 12 in. by 5 in. and seven-ply baseboard 12 in. by 6 in. (Cameo, Peto-Scott).
Two .0005-mfd. bakelite variable di-electric condensers (Lissen, Polar, Telsen, Utility).
Three-point shorting switch (Bulgin "Junior," Lissen, Readi-Rad, Wearite, Tunewell).
Filament switch (Bulgin "Junior," Lissen, Readi-Rad, Wearite, Tunewell).
Three 4-pin valve holders (W.B., Lissen, Telsen, Lotus, Clix, Wearite, Junit, Benjamin).
Dual-range aerial coil (Lotus).
.0002-mfd., .0003-mfd. and .006-mfd. fixed condenser (Telsen, Lissen, Dubilier, T.C.C., Formo, Ormond, Graham-Farish).
2-megohm grid leak (Lissen, Dubilier, Graham-Farish, Telsen).
½-megohm grid leak with wire ends (Lissen, Dubilier).
.0003-mfd. maximum pre-set series aerial condenser (Sovereign, type "J", Formo, Ormond, R.I.).
High-frequency choke (Lewcos, type M.C., Lissen, Lotus, Telsen, Wearite, Climax, Varley, Igranic, Tunewell).
Low-frequency transformer (Lissen "Torex" Telsen, Lotus, Igranic, Varley, Ferranti, R.I., Climax).
1-mfd. fixed condenser (Dubilier, Lissen, T.C.C., Telsen, Sovereign).
Two terminal blocks (Sovereign, Junit).
Four terminals marked Aerial, Earth, L.S.+, L.S.—, (Belling-Lee, Clix, Eelex).
Two spaghetti resistances, one 60,000 ohms and one 30,000 ohms (Tunewell, Bulgin, Lewcos, Igranic, Varley, Lissen, Readi-rad, Telsen).
Connecting wire (Glazite).
Two yards thin flex (Lewcoflex).
Five wander plugs marked H.T.—, H.T.+, G.B.+, G.B.—1, G.B.—2 (Belling-Lee, Clix, Eelex).
Two spade terminals marked L.T.+, L.T.— (Belling-Lee, Clix, Eelex).
Pair of grid bias clips (Bulgin).

ACCESSORIES

120 H.T. battery (Ever Ready, Lissen, Pertrix, Drydex).
9-volt G.B. battery (Ever Ready, Lissen, Pertrix, Drydex).
2-volt accumulator (Exide, Lissen, Ever Ready, C.A.V., Pertrix, Fulier).
Mains unit (Atlas AC244, Ekco, Tannoy, Lissen, Regentone).
Loud-speaker (R. & A., type 40, Blue Spot, Rola, Ormond, W.B., Lissen).

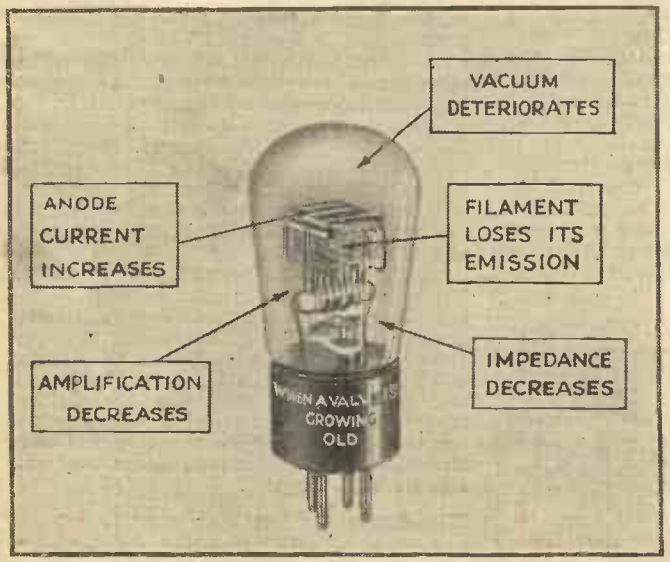
How Long Should Your Valves Last?

Just how long a valve should last is a question that is frequently asked. It is shown in this article that for many reasons it is false economy to continue to use valves beyond a certain length of time

THERE is a great temptation to use valves much longer than the makers intended. Many listeners boast of the years of service they have obtained from valves, little realising how much efficiency is being sacrificed. Several readers have written recently to know just how long a valve should last, meaning how long before there is a definite falling off in the characteristics. This article, based on the considerable experience of a valve manufacturer, should answer the question.

Battery Valves

Let us consider the most popular type of valve, which is the valve with a battery-heated filament. The heart of the valve from the life point of view is of course, the filament, since this is the electrode emitting the electrons.



How a valve deteriorates with age is clearly shown in this picture

If we plot amplification of the valve against time, we find that a practically straight line is maintained for about 1,000 hours, after which the amplification drops off considerably.

With most of the battery valves at present on the market there is a tendency for the valve efficiency to improve over the first three or four hundred hours, due to the gradual hardening of the vacuum. Then up to the 1,000 hours mark, efficiency is constant, but the ensuing falling off may not immediately be noted.

It is generally taken that 1,000 hours corresponds to the total use of a valve over a period of a year. So that normally we might say the one-hundred-per-cent efficient life of a battery valve is a year in the set. But owing to natural human instincts to get the most out of everything it is very likely that such a valve would continue to give satisfaction, of a sort, for perhaps another year. The outside limit of a battery valve should be taken as two years.

Here the reader may, with some justice, ask why we should arbitrarily set a limit to a valve's usefulness; why, indeed, we should not go on using the valve until it completely "gives up the ghost." The answer is that a rather old valve, quite apart from loss of efficiency in terms of amplification, may be extremely greedy of anode current. This important point is all too often ignored.

Costly Running

Take the example of a detector type of valve with an impedance of say 20,000 ohms. Such a valve might, during the normal span of 1,000 hours life, take an anode current of 1½ milliamperes. But when the valve gets old the first effect of senile decay is a drop in the impedance.

Now it is well known that the lower the impedance the higher is the anode current. Thus a power valve with a low impedance takes much more anode current than a high-impedance detector valve. Our 20,000-ohms detector might easily drop with age to 15,000 ohms, and the anode current would rise accordingly, perhaps to 2½ or more milliamperes.

For one valve this increase is not perhaps very important, but just consider the question from the point of view of say a four- or five-valve portable, and then remember that such a set has only a standard-capacity battery. The net increase in anode current might easily be 6 or 8 milliamperes, which would have the effect of shortening the life of the high-tension battery very appreciably.

One of the most forcible arguments against using old valves in a set is the greatly increased running cost. The point to be emphasised is that old valves ought to be scrapped before their sensitivity falls to zero, because in the interim period the valve is being used with excessive anode current.

With mains valves the life is usually less than for battery valves, and D.C. valves have a shorter life than A.C. valves. Perhaps the modern mains valve for A.C. working will have a useful life of 1,000 hours, and then the trouble will be not so much loss of filament emission as the development of grid emission, which tends to increase the anode current and so destroys the vacuum.

Many mains-operated sets that have been giving entire satisfaction suddenly produce very bad quality, indicating that the power valve has gone "soft," through increased anode current, set up by the grid emission.

To sum up: your valves should last a year with average use; they may still be used after that period, but only with a *decrease* in amplification and an *increase* in running costs. Take two years as the outside limit of valve life.

On July 6, North Regional listeners are to hear a recital by George Pritchard on the organ of the College of Technology, Manchester.

For his Midland Regional gramophone recital on July 11. Robert Tredinnick has arranged a "non-stop" variety programme after the manner of the variety programmes now a popular craze. The vocal numbers will be interspersed with band items as in a modern music hall.

Some brilliant examples of the work of one of the most distinguished of European composers will be given on July 4, when a Sibelius concert is relayed from Queen's Hall to National listeners. The concert has been arranged under the auspices of the Sibelius Society and the London Symphony Orchestra will be conducted by Robert Kajanus.

WHAT IT IS FOR

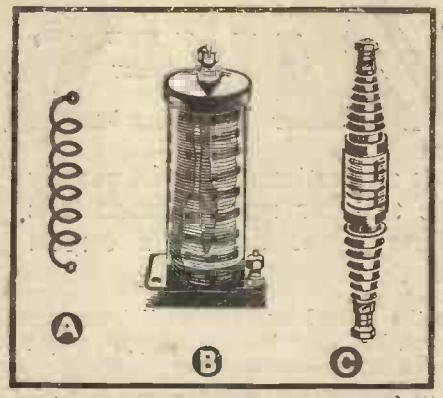
THE HIGH-FREQUENCY CHOKE

WELL named, the high-frequency choke, for its job is to choke back high-frequency current. It does this by virtue of its impedance. Any coil of wire offers some impedance to the passage of high-frequency current, but for the special function of choking back a special coil must be used, or the maximum effect will not be obtained.

For example, if the choke coil has a large self-capacity, some of the current will find its way through the capacity, in spite of the high impedance of the winding.

The self-capacity is formed by current flowing through adjacent turns of the coil, and is of course present to some extent in all coils. But a well-designed coil has its turns arranged so that this self-capacity is reduced to a minimum.

One of the essential requirements in a high-frequency choke, as used in the reaction circuit, or in the anode circuit of the detector, is that the natural wavelength, as formed by the inductance of the winding and the self-capacity, shall be well outside the range of wavelengths with which the set is dealing.



At A is shown the symbol used in circuit diagrams to denote a high-frequency choke. At B is shown the usual construction of a choke for medium- and long-wave tuning. At C is a choke specially designed for short waves, where a very low self-capacity is essential, with quite a moderate inductance

A good choke will have a natural wavelength above 2,000 metres. If the wavelength comes within the set's tuning range instability will be caused as the set is tuned to the wavelength at which the choke tunes.

It might be asked why we could not design the choke so that with quite a small winding its high self-capacity tuned to above the top limit required! The answer is that the high self-capacity would entirely counteract the choking action of the winding, and high-frequency current impeded by the winding would pass freely through the self-capacity.

This happens when a normal high-frequency choke is used on short waves where owing to the enormously high frequencies, the slightest sign of capacity is enough to cause by-passing.

For short-wave sets it is necessary to use a special choke. Fortunately a relatively small inductance is enough to impede high-frequency on the short waves, and of course the small winding has a small self-capacity—usually by spacing the turns on the choke former, or by tapering the two ends.

HOTSPOT.

OUR LISTENING POST

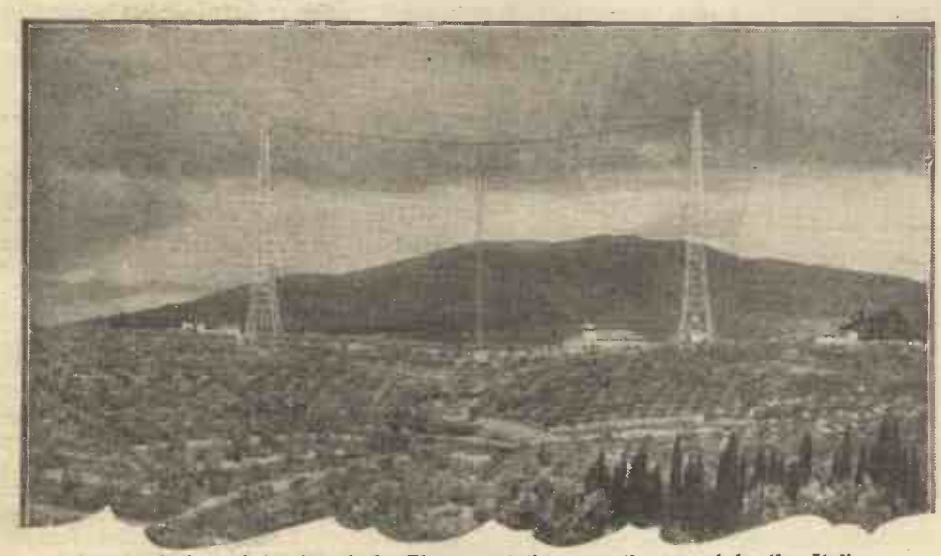
By JAY COOTE

WHEN the new German high-power transmitters take the air, Europe may possibly sit up and take notice, for I understand that in the case of both Leipzig and Breslau the signals are likely to shake up the ether. For some time past the Telefunken company has been experimenting with 300-kilowatt valves and there is a possibility that some of them may be included in the new installations. Leipzig and Breslau are likely to be heard shortly; in fact, by the time these lines are in print you may have picked up their first tests. Frankfurt-am-Main will follow immediately as the transmitter is now ready. Bear in mind that Leipzig and Frankfurt are to exchange wavelengths.

Notwithstanding the fact that the cost of the listener's tax in Germany is—at par—six times what it is in the British Isles, the financial position of the broadcasting companies is such that stringent cuts and economies have to be carried out. In future there will not be such a variety of programmes as arrangements have been concluded between the individual cities for a more regular interchange of entertainments. You may already have noticed how frequently Berlin, Breslau, Heilsberg and Leipzig broadcast a common programme and how Stuttgart and Frankfurt switch over to each other's studios at different times of the day and evening. In the same way Munich, Mühlacker, Frankfurt and Langenberg will link up to feed their respective areas.

By this time the fate of the new broadcasting schemes in Spain will have been decided and the outcome of the Government's final decision will be anxiously awaited. So far the most popular plan is the one which calls for two transmitters in the neighbourhood of Madrid, one of 120 kilowatts to work on a long wavelength and a 20-kilowatter to operate on the medium-wave band. In addition, Barcelona, Valencia, Seville and Corunna are to be given a 20-kilowatt station each and Bilbao must be content with one of 10 kilowatts. The Barcelona press, by the way, has already protested and demanded for Catalonia a transmitter of at least 60 kilowatts.

What is actually happening in regard to Radio Luxembourg is not quite clear. Considerable publicity has been given to the new station and yet I am informed by a correspondent that the 200-kilowatt transmitter which was to be installed there has proved unsatisfactory and that the shareholders refused to take it over! In the meantime it is stated that plant of lesser power has been ordered elsewhere. However, we can only wait and see what happens.



A general view of the site of the Florence station recently opened by the Italian Broadcasting Company. The two masts are each 300 ft. in height, and the transmitting installation consists of a Marconi equipment of 20 kilowatts

The Brussels Stations

Apparently Radio Schaerbeek may, after all, prove an alternative to the Brussels No. 1 and No. 2 studios, for since its re-opening its signals are decidedly stronger. The new station is situated at Crainham some six miles from the Belgian capital and possesses a studio capable of accommodating a large orchestra. The Brussels studio is connected by landline to one or two of the most popular music-halls and restaurants and in future the programmes are likely to provide interesting items.

PTT Paris has taken on television transmissions, which are broadcast every Monday and Tuesday between 5 and 5.45 p.m. and on Thursdays and Fridays between 4.45 and 5.30 p.m. B.S.T. Vision is transmitted on 447.1 metres and sound on 296 metres. You may have heard fragments of the latter broadcast when tuning in Hilversum.

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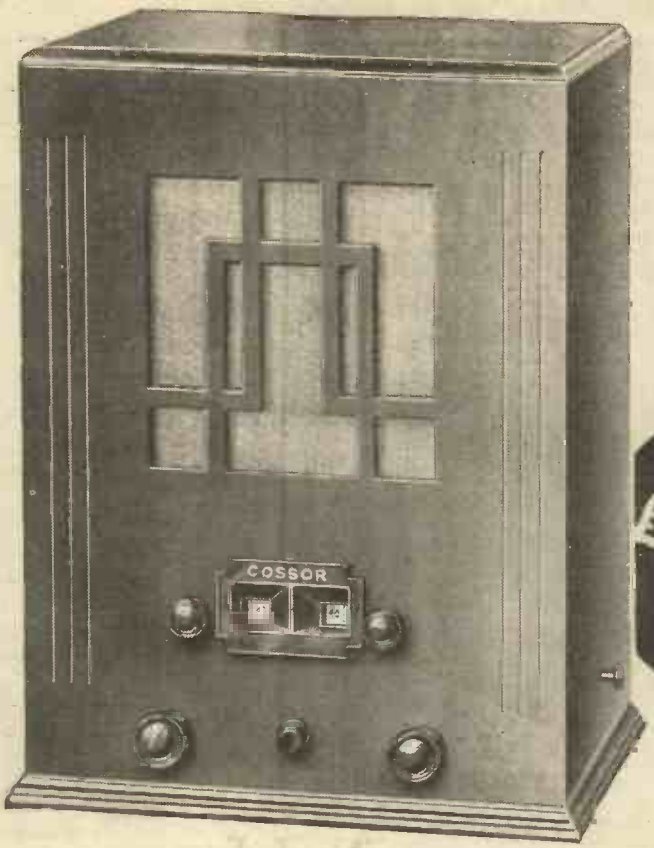

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On Your Wavelength!

AN IDEA FOR THE B.B.C.

IT is a good many years ago now that the B.B.C. staged a particularly interesting competition. I wonder how many readers are old enough wireless hands to remember it. In the studio a series of noises was produced. There were about twenty in all, I think, and they included such things as striking a match, hitting a tack with a hammer (they didn't give us hitting a thumb in the process!), tearing calico, jingling keys, and so on. Listeners were asked to write down what the noises represented and the correct list of answers was then published. A revival of this competition would be especially interesting nowadays, owing to the enormous improvements made, not only in broadcasting microphones, but also in receiving sets and loud-speakers. In the original competition such a small part of the range of sounds that went to make up each "noise" was actually transmitted and received that it was probably mainly a matter of chance whether anyone was able to give the right answers or not in many cases. To-day, almost if not quite the whole of the range of sounds can be transmitted and received. There probably exists somewhere in the archives of the B.B.C. a list of the sounds that were sent out, and I would very much like to see a repetition of the programme staged.

DO YOU REMEMBER?

HOW many of you, I wonder, can remember clearly just how elementary reception of wireless programmes was ten years ago? With the best of receiving sets then available not a single sound of the pedal notes of the organ could be heard. I well recall tuning-in the first organ broadcast with a set which was at the time just about as good as a wireless set could be. Though the organ was a fine one, its music sounded exactly like that produced by the kind of portable harmoniums that queue entertainers use. The other night we heard the relay of the Aldershot Tattoo and marvelled at the wonderful way in which the drums of the bands of eighteen battalions came through. Do you remember the first Tattoo broadcast? The drums then sounded rather like hail pattering on a corrugated iron roof. And perhaps the funniest thing of all in that broadcast was the sound of rifle shots. Many people could not hear the shots at all, and to those whose sets could reproduce them in any way, they sounded more like the splutterings of a soda-water siphon than anything else. Broadcast dramas were often excruciatingly funny where they were meant to be tragic, owing to the queer way in which the "effects" came through. We have certainly advanced a lot since those days and there are very few sounds now which cannot be reproduced realistically.

THE IMPORTANCE OF SPEAKER SENSITIVENESS

THE importance of sensitiveness in a loud-speaker is not always realised. If you give the matter a little thought, though, you will soon see that it makes a great deal of difference to the fidelity or otherwise of reproduction. Look at it in this way. The more sensitive a loud-speaker, the smaller the current fluctuations necessary in the plate circuit of the output valve to give you the volume of sound that is desirable. Hence, with a sensitive speaker, smaller grid swings applied to the output valve will do all that is necessary. The less these swings, within reason, the better will be the performances of the valve, since it will always have something in hand in case an abnormally big swing comes along. With an insensitive speaker the last valve is often working pretty well all out all the time, and every now and then you get distortion, due to overloading.

If the loud-speaker is sensitive, this kind of distortion with its very unpleasant effects does not occur. Another point of importance is that you can bring in distant stations with less use of reaction. Or, again, you can obtain the necessary volume of sound by using an output valve with a smaller magnification factor and capable of handling larger inputs. If, when you are having speakers demonstrated, your choice lies between two whose tone is equally pleasant, I would recommend you to go for the more sensitive of the pair.

WHERE SHOULD IT BE?

I AM conducting a little friendly war with certain makers of loud-speakers over the question of the output transformer. They maintain that it should be mounted in or on the speaker, whilst I claim that it should, if possible, form part of the receiving set. One of the chief reasons for my contention is this. Many of us operate the speaker at a considerable distance from the receiving set. If the transformer is incorporated in the instrument the whole of the plate current in the last valve must necessarily pass through long leads. I, personally, would much rather keep a direct current of, say, 25 milliamperes at 200 volts inside the set than have it coursing through long lengths of flex or other wire. With the transformer inside the set the speaker leads have, of course, only the oscillating part of the current to carry.

And there is another reason why I am all against building the transformer into the loud-speaker. Heaps of sets nowadays have output transformers inside their cabinets. You install a speaker with a built-in transformer, and what exactly are you to do? You certainly cannot use two transformers and there are only two possible solutions. One is to eliminate the set's own transformer; the other is to fiddle about with the speaker and alter its wiring so that the speech coil windings are connected directly to its input terminals.

BRIGHTER SUNDAYS

FROM what I hear, the B.B.C.'s brighter and longer Sunday programmes are being very much appreciated by listeners. The music seems to have been most happily chosen, so far, and I haven't come across anybody who has anything but appreciation to express. The provision of longer Sunday programmes is certainly a step in the right direction. It is, incidentally, one that I have been urging in these columns for more than five years, and I am more than glad to see that something has at last been done. I am not satisfied yet, though, and I still have hopes that the B.B.C. will one day give us the Sunday programmes that we ought to have. I have always said that they should be the very best of the whole week, and that view is, I know, shared by innumerable listeners.

LAYOUT AND STABILITY

I WAS referring the other week to the need for careful layout when dealing with modern high-frequency valves. I had an interesting example of this on an experimental chassis with which I was working at the time. The receiver in question was one employing a high-frequency valve followed by a detector and a pentode. The whole set was built up on a metal chassis and the coils were included in cans in the usual manner. The layout underneath the chassis was reasonably tidy and most of the leads were comparatively short, so that I expected to obtain good results. Up to a point, this hope was justified, but I was troubled with an instability which occurred towards the bottom of the medium-wave scale. Nothing I could do had any effect on this trouble. The H.F. valve was de-coupled, and so was the detector, but I improved the de-coupling arrangements in order to make sure this was not responsible for the trouble.

HOW FEED-BACK IS SET UP

NO success attended these experiments, and I was rather puzzled to know what to try next. As the coils were all completely screened, there was no apparent possibility of stray coupling, but I got hold of a piece of wire and began to make sure of the earth connections. With a chassis it is often possible to obtain circulating currents in the metal itself, and as the metal has appreciable resistance this develops small voltages which are sufficient to cause reaction or even self-oscillation. I found that this had been happening in the present instance. The earth return from the

On Your Wavelength! (continued)

H.F. circuit was not taken to the chassis at the nearest point, but through a lead about two inches long to a common earthing point where several other leads had joined. On the face of it, this looked as if it would be the most suitable plan, but it so happens that, owing to the meeting of the several leads, the currents from various points of the circuit were all flowing through one small portion of the chassis and a feed-back was set up rather in the same way as a high-tension battery will cause motor-boating, due to its own internal resistance. Anyhow, I connected the earth return from the H.F. valve straight to the chassis at the nearest point, and the whole trouble was overcome forthwith.

THE WRONG WAY

THE other day I was listening to a friend's set when the owner, for no apparent reason, decided to try the effect of altering the grid bias. Opening up the innards, he promptly started to prod the grid lead up and down the G.B. battery in a most light-hearted way—whilst the set was still going, mark you! Now this is quite the wrong way to do it, as I promptly pointed out. Every time the grid is left "in the air" and then jammed back to "bias" the valve gets quite a nasty jolt. No doubt it is quite capable of standing up to this kind of treatment for quite a long time—because the modern valve is a pretty robust piece of work—but there is such a thing as the last straw. After all, it's quite a simple matter to switch the set off before altering the bias, and then to switch it back again to note the effect.

SPEED COMPARISONS

BROADCAST programmes travel through the ether with the velocity of light—namely, 186,000 miles a second—which, curiously enough, is slightly faster than the speed at which an electric current flows through an ordinary conductor. Over short distances, telephone transmission is almost as speedy as wireless, but for trunk calls where the wires are "loaded" it falls distinctly behind. For instance, speech currents travel over an unloaded line at approximately 180,000 miles a second, the slight retardation being due to the self-inductance of the wire. But when the line is pupinised, as is necessary to prevent distortion over long distances, the building-up of the external magnetic field introduces quite a considerable delay. Actually the speed drops to between 10,000 and 20,000 miles a second, according to the particular note-frequency involved. High notes on a loaded line tend to travel at a different speed to low notes, and telephone engineers have to adopt special measures to prevent distortion due to this cause.

FASTER THAN LIGHT

IN certain cases, particularly in beam wireless, it is necessary to feed an extended aerial system with radio-frequency currents which are strictly "in phase" with each other, so as to secure the best directional effect. Since some parts of the aerial system are spaced farther away from the power-supply point than others, this can only be done by regulating the speed at which the electric currents flow along the feeder-lines. In other words, the currents supplying the more distant sections are "speeded up" relatively to those energising the nearby sections. Usually this is done by "loading" the shorter feed-lines so as to retard the current flow along them, but it is also possible to advance the phase by inserting series capacity in the longer lines, so that the currents, in effect, seem to travel at a speed even greater than that of light. This appears to me to be going one better than Einstein, though it is a point that only the mathematicians can decide.

ELECTRIC-LIGHT NOISES

I HAVE come across recently quite a number of places in which noisy reception occurs when the electric lights in the house, in which the set is used, are switched on. The owner of the set is naturally rather puzzled, for he cannot make out why it should be that the set emits noises while the lights are on and all is quiet before lighting-up time. There are two possible causes. The first is that the wires between the switch and one of the lights are rather close to the set. When current is switched on impulses from them are picked up and noisiness occurs. But the commonest cause is that one or other of the electric-light bulbs in the house fits badly in its socket and wobbles slightly. I have even known one case in which a loose bulb caused noisy reception to people two doors away. If you find that your set is noisy when the lights are on it is as well to get an electrician to examine the wiring of your house, or of the room in which the set is used, and to go over the switches and the fitting of the bulbs in their holders.

NEW VALVES FOR OLD SETS

THERE must be thousands of receiving sets in use which are three, four, or even five years old and are still going strong. All is well, as a rule, until one or other of the valves gives out and must be replaced. Then comes a difficulty of no mean magnitude. The set was designed for the inefficient valve available in its heyday, and if you place in its holders modern highly efficient valves the result may be that it flies right off the handle, so to speak, and becomes uncontrollable. Some makers, though they don't advertise them, still have a stock of old valves, and these can be obtained by special order. It is, I think, better to obtain the older pattern valves than to try to use modern valves in an old set. This applies particularly to the high-frequency side of sets using unneutralised tuned-anode or tuned-transformer circuits. THERMION.

PERSONALITIES IN THE WEEK'S PROGRAMMES

The model of Radio City—America's new giant sponsored programme centre

ARE SPONSORED PROGRAMMES COMING?

A question raised by Alan Hunter, who outlines the present position of the B.B.C. in relation to sponsored programmes

WHY has the vexed subject of sponsored programmes been revived just recently? Partly, perhaps, the talk is inspired by the growth of foreign-station activity in putting over programmes for English listeners paid for by advertising interests in this country. But principally there is the increasing fear that the Treasury may suddenly decide to appropriate the whole of the licence revenue and tell the B.B.C. to fish for itself for money among the seas of commerce.

First of all, are we quite clear what we mean by a sponsored programme? The idea originated in America, where it is extensively practised at the present time. The broadcasters arrange a programme, which is paid for by an advertiser, whose *quid pro quo* is a microphone acknowledgement, either of the firm or of the firm's products.

The firm thus seeking advertisement by means of a broadcast programme is said to "sponsor" the programme, which will usually be something in the popular line, in order to leave a pleasing impression on the listener's mind. Such is the alleged power of association that if you are pleased with the programme ideas of, say, a toothpaste firm you will, eventually, feel constrained to clean your teeth with that particular firm's paste!

The B.B.C. Licence

Such a method of utilising the broadcasting services of the country is actually visualised in the licence under which our B.B.C. operates. Not many listeners seem to realise this, so I will briefly quote the relevant clause.

"The Corporation shall not, without the consent in writing of the Postmaster-General, receive money or any valuable consideration from any person in respect of the transmission of messages by means of the stations . . . provided that nothing in this clause shall be construed as precluding the Corporation from broadcasting matter *provided gratuitously* by any person *with or without an acknowledgement* of such provision by means of the broadcasting service." (The italics are mine.)

There it is, set down in black and white in the licence—so do not imagine that there is any political obstacle in the way of an immediate introduction of the sponsored-programme idea.

Yet, in spite of this explicit provision in the licence of the Corporation, there has never been any real attempt to exploit the idea. The reason is obvious enough to anyone acquainted with the ideals of those behind our broadcasting. The aim is public service, and this is deemed, rightly or wrongly, to be incompatible with a widespread interference with the programmes by outside commercial interests.

And while the licence revenue is continually growing, in spite of the diminishing percentage retained by the B.B.C., there has been no financial reason why outside interests should be consulted or encouraged.

It comes to this, then, that while the B.B.C. is assured of its present source of revenue, that is, from the licences, it will steadfastly set its face against the idea of sponsored programmes. Yet if the Treasury grabbed the whole of the revenue from listeners' licences, the attitude at Portland Place would inevitably have to be changed.

To me it seems rather improbable that our present system will be radically changed before the Charter expires in 1936. We are, in a way, a model of monopolistic broadcasting, and there is so much to be said for our system that a progressive young country like Canada sees fit to renounce its commercialised system and set up a Government controlled broadcasting authority in its place. And this decision was taken after all the "big guns" of the American broadcasting chains had given evidence in favour of sponsored-programme broadcasting.

Still, such considerations may not weigh as heavily as I imagine they do, and we are left to speculate what would happen in the event of a Treasury appropriation of the entire licence revenue.

One suggestion immediately arises—double the present licence fee. Make it £1 and then the present system of programme compilation could be retained, and at the same time the revenue to the Treasury would be very substantial. Would listeners pay the extra fee? I know it would hit many listeners hard, though the burden could be alleviated by payment of half-yearly or even quarterly instalments.

Failing an increase in the licence fee, and assuming a total appropriation by the Treasury, what are we left with? A B.B.C. faced with the problem of finding the money to carry on the broadcasting service.

An enormous amount of re-organisation would have to follow, because some form of *liaison* between the programme departments and the advertisers paying for the programmes would be wanted.

The American Parallel

It is fatally easy to compare broadcasting in this country with that of America, but not so easy to remember that while we are on a little island, America is a vast continent. The point is that advertising by radio in America is often a coast-to-coast affair, involving dozens of stations all over the continent.

Compare that with our simple little regions, with only two stations in each, and then some of the real programme difficulties become apparent.

I mean, while all discussion on the sponsored-programme idea seems to revolve round the listener point of view, the more sordid question as to whether such a scheme would pay in such a relatively small area of transmission is seldom raised.

To sum up, I should say that if sponsored programmes do come it will be through lack of revenue, and that can only be visualised by some move on the part of the Treasury. Those who have come round to the view that sponsored programmes are not necessarily a *panacea* for the present defects of the B.B.C. will surely join with me in hoping that its revenue is left alone.

CLEANING THE VANES

Scratching noises when you move the vanes of a condenser can generally be

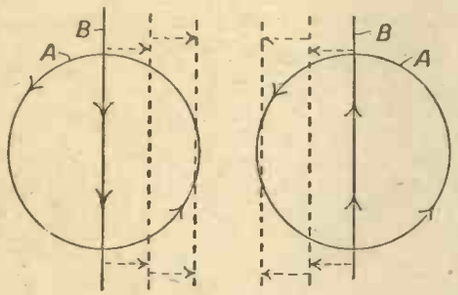
cured by pushing a pipe cleaner between the vanes to get rid of the dust. Make sure you don't alter the vane spacing so that the condenser "shorts."

A NEW TELEVISION SCANNING SYSTEM

A Novel Idea Described by Morton Barr

IN television the picture or scene to be transmitted is first split up into a large number of elementary areas, and the light or shade of each of these is transmitted separately and in rapid succession. To secure the effect of smooth motion it is necessary to traverse the whole of the scene in this way from twelve to fourteen times in a second.

In reception the process is reversed. Each signal element is applied in succession to a neon lamp, and the resulting variations in light intensity from the lamp are thrown in correct sequence on to a viewing screen, the distribution being effected so rapidly



Figs. 1A and 1B, showing how current flow will affect an adjacent conductor

that the complete picture is reconstituted at least 12 to 14 times per second.

Mechanical Scanning

The ordinary method employed for breaking-up the picture at the transmitting end, and for reassembling it in reception, depends upon the use of a rotating disc fitted with spiral holes which "scan" the

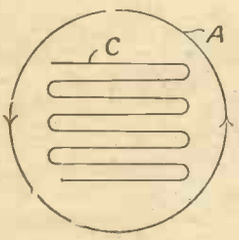


Fig. 2A showing the course of travel of the scanning spark

whole scene once during each complete revolution of the disc.

The use of such scanning discs is open to certain objections. On the one hand it places a limit on the size of the picture that can be transmitted in reasonable detail, and on the other it leads to difficulties in synchronising the disc at the transmitter with that used at the receiving end. A rotating disc possesses considerable inertia, so that comparatively large forces must be applied to check or accelerate its rate of revolution.

Both difficulties would disappear if it were possible to use a scanning device of a non-mechanical nature. Where there is no mass there is no inertia, and not only can very high speeds be employed, but such speeds can be controlled or regulated by the application of comparatively small forces or impulses.

A Recent Development

The latest advance in this direction is based on the following well-known principle. If an electric current is flowing anti-clockwise through a coil of wire A, Fig. 1A, as shown by the arrow, it will tend to move an adjacent straight wire B, carrying a down-flowing current, bodily to the right, as shown by the dotted lines. On the other hand, if the direction of the current in the wire B is reversed, so that it is flowing upwards as shown in Fig. 1B, the thrust on the wire is also reversed, and the latter will be moved bodily to the left.

Next, suppose the wire B to be replaced by an electrode system C, Fig. 2A, (shown in greater detail in Fig. 2B). The electrodes consist of a pair of interleaved wires C, C1, arranged so as to form a sinuous path from one end to the other. The top wire is positive, the second negative, the next positive, and so on.

If now an arc discharge is started at one end of the electrode system, by applying a high-frequency voltage to the point M in Fig. 2B, the pulse of current forming the arc flows in a downward direction. The influence of the current in the surrounding coil of wire A therefore comes into play. The conditions are similar to those illustrated in Fig. 1A, and the arc (which corresponds to the current in the wire B) at once starts to move bodily along the two electrodes towards the right-hand side.

A "Free-moving" Arc

When it reaches the other end of the top track, owing to the fact that the outer electrode is positive and the inner negative, the arc is forced to travel around the corner in the manner indicated by the small arrows. Once it has turned the corner it is obviously changed into an upwardly-moving current, so that it will be now urged to the left by the current in the surrounding coil. As it reaches the end of the second traverse, it is changed once more into a downward-moving current and is accordingly impelled in the opposite direction. The process continues until the arc has completed the whole zig-zag course from top to bottom of the electrode system.

It is extinguished at the bottom and immediately restarted by a suitably timed voltage impulse applied to the free end, M, of the top electrode.

We have, in fact, provided a free-running source of light which automatically scans the picture from side to side and from top to bottom in the same way as a rotating disc.

High-speed Scanning

Similarly, the speed at which each complete traverse is repeated depends solely upon the frequency of the voltage impulses applied to the top end, M, of the electrode system.

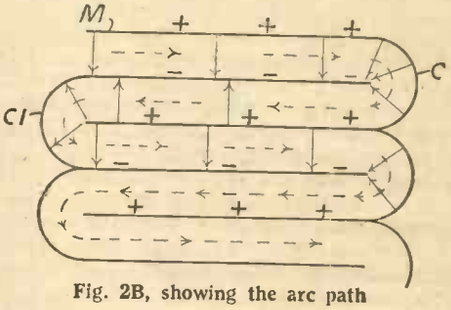


Fig. 2B, showing the arc path

In practice the scanning arrangement is enclosed in a light-proof casing, and the light from the rapidly-moving arc is focused by a lens either on to the picture or on to the viewing screen.

At the transmitting end, the light reflected from the picture is received by a photo-electric cell, the output from which is used to modulate the outgoing carrier wave in the usual way. In reception the incoming signals are used to vary the voltage applied across the electrode system, so that the resulting arc changes in intensity with the varying light and shade values of the original picture.

Synchronising

Synchronising is effected very simply. The high-frequency voltage (used to "start" the arc at the transmitting end) is superimposed on the actual carrier wave used to radiate the signals. It will therefore automatically start up the arc at the receiving end at the same time as that at the transmitter.

Subsequent timing signals are also radiated each time the transmitter arc passes round one of the corners of the electrode system, by arranging a small projection at each "turning point" so as to shorten the length of the arc. This momentarily decreases its resistance and automatically applies a timing-impulse to the carrier wave, which it utilised at the receiving end to keep the local arc accurately in step with the one at the transmitter.

Our Broadcast Critic TALKS ABOUT NEGRO MELODIES

Jeanne de Casalis
of "Mrs. Feather" fame

ONE of the most distinctive recent broadcasts was Derek McCulloch's *Going South*. As the programme stated, it consisted of a series of local cameos of the Southern States as seen through the eyes of a coloured Pullman conductor. The idea was wholly to set an atmosphere for a broadcast of Negro melodies. This might easily have failed and have resulted in a production that was a mere excuse for dragging in the songs, however well they may have been sung by the Temple Quartet. As a matter of fact, they were *very* well sung.

It turned out very differently, largely through the playing of the Pullman conductor by Percy Parsons. His deep voice—one of the deepest I have ever heard in a production of this kind—seemed to establish the character of the Pullman conductor right from the start. One felt that this nigger was a cut above the general run of niggers, and that he took an honest and affectionate interest in the songs of his own country.

The whole production was so strong atmospherically that I, for one, quite forgot my present surroundings. In the wireless sense, this is very high praise. At least, I mean it to be because I have maintained all along that productions with a single thought behind them are the only kind suitable for wireless transmission.

◆ ◆ ◆

I heard the first of the two relays from Canterbury Cathedral. I found myself wondering why the B.B.C. orchestra must go to Canterbury in order to broadcast. I felt that, in these days when musical work is so hard to obtain, it might have been a better arrangement for the orchestra to have been composed of men not regularly employed by the B.B.C. More than one professional musician has spoken to me on the matter. I think the B.B.C. might take the hint.

◆ ◆ ◆

I wonder if anyone noticed a charming, but unrehearsed effect at the end of the programme? The orchestra was playing Wagner's exquisite *Siegfried Idyll*. I happened to be sitting at a table with a score in front of me. As the work drew to a close, just after the well-known passage where the flute imitates a sort of bird-call, I became conscious of sounds not represented in the score. Both my wife and I thought a bird was singing in the garden at first, but it was dusk. When we listened more carefully we realised that the bird was in Canterbury. We could distinctly hear him in the loud-speaker; he was probably near the cathedral cloisters and had decided to join in! I am no ornithologist and therefore do not presume to suggest what type of bird it was; it would hardly be a nightingale so near a city! It is interesting, especially because it recalls Beatrice Harrison's success with her 'cello. At all events the effect made a charming conclusion to an attractive programme.

◆ ◆ ◆

The *Pink, Pink Vase* made a good radio production. The plot was entertaining, but I thought the best part was the music by Leslie Woodgate. I congratulate Mr. Woodgate on writing music distinctly English in type and on not being afraid to write up to a high level musically.

◆ ◆ ◆

Did you hear the fifth Hazard? I was amused at Mr. Weston Martyr's style in narrating his story. He invited any of us to accompany him in our imagination on a voyage in a schooner. In mentally obeying his wishes I stepped aboard quite gaily. Long before he had finished I wished myself anywhere but on that boat. There are luxuries in this world I am content to miss; that was one of them.

◆ ◆ ◆

Waterloo was quite a success, especially the scene before the battle. I criticise the guns in the battle scene; I think a deeper-toned drum would be more effective for that sort of thing. The one used sounded to me like an ordinary kettle-drum. The best part of the play undoubtedly was the scene in St. Helena. It brought out Napoleon's characteristics. Norman Edwards and Val Gielgud are to be congratulated upon producing what might well become a wireless classic. It will certainly stand repetition each June 18.

◆ ◆ ◆

I have not heard as much vaudeville this week as I generally do, but what I have heard was, on the whole, good. It was certainly a lift-up in vaudeville to have Tom Burke and his Human Voice Orchestra, particularly as they sang an attractive arrangement of Chaliapine's famous song, "When the King goes forth to War." There were some very pleasing choral effects. Mr. Burke's singing of the last verse (where the serf is laid to rest) was really beautiful.

◆ ◆ ◆

Another singer attracted my attention, partly on account of his good singing but also, I fear, on account of the words of his first song. Surely it is not good enough to expect us to swallow sentiments like "she dims the light and holds me tight"? I appeal to Mr. Geoffrey Gwyther to give his present lyric writer a pension and try again. The day has long passed since we appreciated rubbish of that kind.

◆ ◆ ◆

The most brilliant turn I heard during the week was Jeanne de Casalis in another of those amusing "Mrs. Feather" episodes. Mrs. Feather is now one of the most attractive, and also most inconsequent microphone personalities. Her "creator" is certainly one of the best vaudeville broadcasters because she always keeps an eye on the microphone. Every line is delivered for her invisible audience. There is no difficulty in following any of her telephone conversations—however distressed she may become at being misunderstood by the person at the other end—because she words her dialogue so that her audience gets both sides.

WHITAKER-WILSON.

PROGRAMME POINTERS

Theoretically the value of an alternative programme is to provide a choice of entertainment, the two programmes being presumably of equal value and of the same high standard of performance. In practice this has not been so—perhaps it is too much to expect. The scheme has worked out in the main to provide sharply contrasted matter, such as a symphony concert versus a light orchestra programme or something like "Songs from the Shows." That, in the broadcast sense, is good alternating because lovers of symphony are not disappointed at missing the light orchestral music any more than devotees of light songs mind missing a Beethoven concerto. I have noticed, however, cases of less fortunate alternating. My weekly work of choosing items for review in this journal has taught me that the programmes are not always watertight in this respect. Saturday, June 18, offered an example. There was a good vaudeville on the London Regional at 8.45. The play "Waterloo" was on the National at 8. I began with the play, but I switched into the Regional about 9.10 in time to hear Jeanne de Casalis. I should like to have continued, but wanted to hear the Hazard at 9.20 on the other programme. This is not good alternating. A vaudeville should be opposed by chamber music, or at least by something that will appeal to people who do not like vaudeville.

The "M

This photograph shows the unit connected to the "Mascot" receiver

WIRELESS set users can be placed under three headings. Firstly, we have those who are so situated that they are entirely dependent on batteries, both high and low tension. Secondly, we have the group which finds it quite easy and convenient to use an accumulator, but, having the mains in the house, would like to use them for the high-tension supply, thereby avoiding the regular expense of high-tension battery replacement; and, thirdly, we have those who desire their sets to be entirely mains driven. In working out the design for the "Mascot" receiver, described in Nos. 509-510, all three classes were borne in mind, but as probably most listeners require battery operation, the battery model was the first to be described.

The three distinguishing properties of the "Mascot"—selectivity, quality and power, are all connected with one special and inherent quality of the set—stability. In a set which is really stable, particularly at the low-frequency end, very loud and pure signals can be obtained when using modern output valves with quite an economical high-tension consumption. At the same time, however, to get a really big volume of undistorted power an output valve capable of handling the power must be used and such valves are necessarily greedy of high-tension current. As practically the only distortion of loud signals in the "Mascot" receiver results from overloading the output valve, many readers have written me asking that a high-tension mains unit should be designed specially for the "Mascot" so that such a super-power valve can be economically used.

This week, therefore, I propose describing the special "Mascot" mains unit which has many interesting features. Made to match the "Mascot" both in height of panel and depth of baseboard, it can either be "boxed" separately or combined with the "Mascot" receiver in a cabinet made to take a panel 25 in. by 7 in. It is, as you will see from the drawings and photographs, extremely simple to construct. A feature is that so long as it is turned on, the word "On" appears in brilliant red letters in the small window on the panel above the on-and-off switch. Also it contains inside a special safety fuse arranged to protect both the unit and the valve itself. If any one of the condensers breaks down the fuse blows at once, as no more than 100 milliamperes can pass through it.

H.T. or All Mains

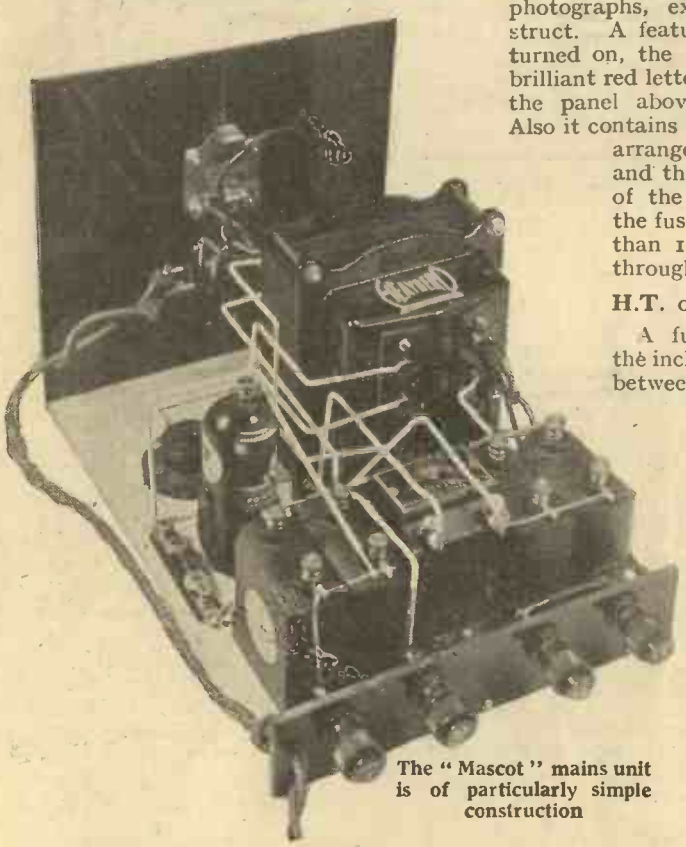
A further important point is the inclusion of a power resistance between the choke and the output condensers which can be changed to suit varying conditions. For example, modern battery valves are designed to run with a maximum high-tension voltage of 150, while the mains valves will safely stand 200.

H.T. only or All-mains

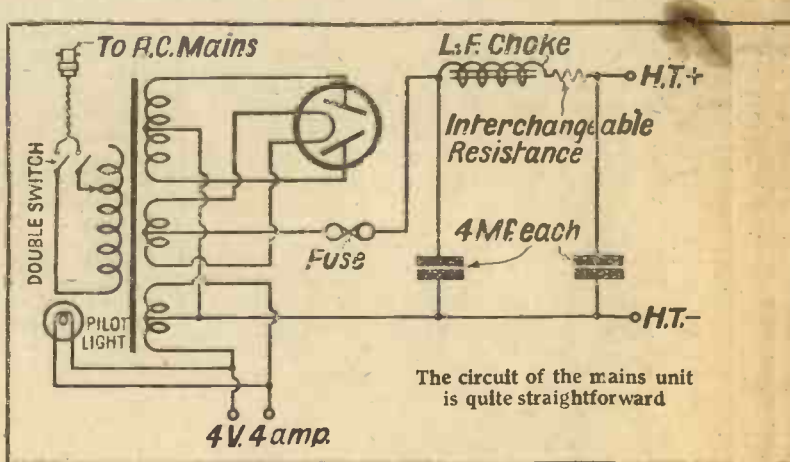
The "Mascot" mains unit is designed to supply high tension for both battery sets and all-mains-driven sets, this resistance is selected at the time the set is built so as to give the correct output voltage for either type of valve. Further, a 4-volt winding, capable of giving 4 amperes if necessary, is provided for the heater current of the mains valves. When using this set with battery valves the two 4-volt terminals are left disconnected and in this case serve only to light the pilot lamp behind the window that shows the word "On."

Limiting the Voltage

As this unit is designed to give an output voltage of 200, and battery valves are designed to run at a maximum high-tension of 150, provision is made to insert a resistance in order to reduce the voltage to this latter figure if desired. The value of this resistance is dependent upon the valves used, but a safe rule is to use a 4,000-ohm power resistance if the output valve is of the ordinary power type, and a 2,000-ohm resistance if it is a super-power valve such as the Mullard PM252,



The "Mascot" mains unit is of particularly simple construction



The circuit of the mains unit is quite straightforward

"MASCOT" MAINS UNIT

PERCY W. HARRIS describes a simple unit for converting a battery-operated set for use on the mains

Mazda P220A, Cossor 230XP, Marconi or Osram P240, and so on.

The Circuit

In previous articles I have discussed various types of mains units and you will be interested to examine the theoretical diagram showing how this particular unit is made up. The input from the mains comes to a quick make-and-break mains switch which disconnects *both* sides of the mains, and from here to the primary of a mains transformer. On the primary side of this transformer you will find four terminals, marked "50 P.," "200," "230," "250." One wire from the switch goes always to the terminal marked "50 P." and the other goes to 200, 230 or 250, depending on your mains A.C. voltage. The output terminals are provided in three groups, two of them are 4-volt windings each with a centre tap, and the third set is the true high-tension winding giving 230 volts on either side of the centre tap.

Heater Supply

The two 4-volt windings have to be very carefully insulated from one another, for one of them (that on which the centre terminal is marked "4 amps.") is designed for the low-tension heater; the other, which has its centre terminal marked "1 amp.," is for heating the filament of the rectifier valve. You might think that one winding would serve for both purposes, but on examining the circuit diagram you will see that the centre tap of the 4-volt 1-amp. winding supplies the positive H.T. terminal, therefore this winding is at high-tension all the time.

A pair of leads is taken from the 4-volt 4-amp. winding to the 4-volt output terminals and another pair to the panel-mounting pilot light behind the red window. This little pilot lamp takes a very small current, so that the additional load on the winding is negligible. The valve, as you will see, is a full-wave rectifier and the two ends of the high-tension winding go to the two plates respectively. The opposite ends of this winding are alternately positive and negative and each time each plate of the rectifier valve becomes positive the current flows across the space between the particular plate and the filament.

Simple and Inexpensive

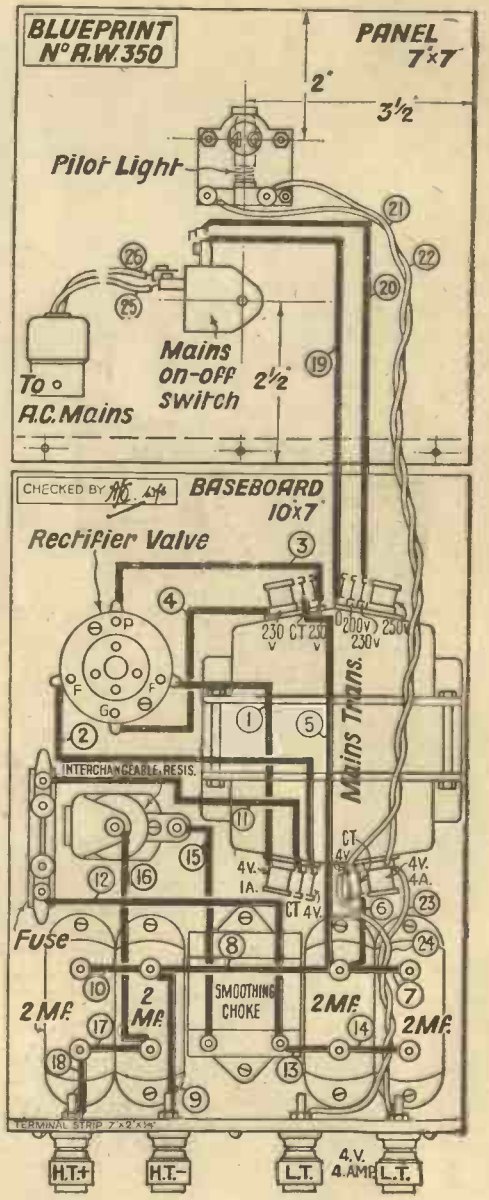
Considering the conventional way, the flow of current is always from the plate to the filament, and as each plate is alternately positive a series of pulses of high-tension current pass across the vacuum to the filament, through the heater winding and from the centre tap of this to the filter. Immediately after the centre tap the 100-milliampere fuse is placed so that all the current through the rectifying valve passes through this. From the fuse a lead goes to the first choke and to two 2-microfarad condensers in parallel, through the choke to the series resistance, from this to two more 2-microfarad condensers in parallel, and thence to the high-tension positive terminal. As explained in previous articles the choke with the two pairs of condensers (naturally, it does not matter whether we have two 2-microfarad condensers in parallel or one 4-microfarad) forms a very simple and efficient smoothing unit. The resistance is included between the choke and the output condensers so that it is fully shunted by these condensers and at the same time adds to the smoothing effect.

As the "Mascot" receiver is designed for one high-tension positive, the necessary voltage dropping for the detector being included in the set itself, there is no need to have more than one high-tension terminal. In this way our unit is both simpler and less expensive than otherwise would be the case and readers will save the expense of building a mains unit with several voltage tappings when these are not likely to be used.

(*Continued on next page*)

THE CIRCUIT AND COMPONENTS

Ebonite panel, 7 in. by 7 in. (Peto-Scott, Readi-Rad, Becol, Lissen).
Terminal strip, 7 in. by 2 in. (Peto-Scott, Readi-Rad, Becol, Lissen).
Baseboard, 7 in. by 10 in. (Peto-Scott, Readi-Rad, Cameo).
Mains transformer (Heayberd, type 715).
Smoothing choke (Varley Nichoke II, Lissen, Atlas, Telsen, Igranic, R.I.).
Four 2-mfd. fixed condensers (Lissen, Telsen, Ferranti, Dubilier, T.C.C.).
2,000-ohm or 4,000 fixed resistance and holder (Varley, Lissen, Igranic, R.I.).
4-pin valve holder (W.B., Lissen, Telsen, Igranic, Benjamin).
Two-pole mains snap switch (Wearite, type G.42 : Bulgin).
Pilot light (Readi-Rad, Bulgin).
100 ma. fuse and holder (Microfuse, Bulgin, Belling-Lee).
Four terminals, marked H.T.—, H.T.+, 2 L.T.A.C. (Belling-Lee, type "B" : Bulgin, Clix, Eelex).
Connecting wire (Glazite, Quickwyre, Jiffilinx).
Mains flex (Lewcos).
Mains plug (Bulgin)
Valve, DW2 (Mullard) or 506BU (Cossor).



The layout and wiring diagram of which a full-size blueprint is available, price 1/-

IN MY WIRELESS DEN

Weekly Hints — Constructional & Theoretical

By W. JAMES

A CURIOUS POINT

I WONDER how many readers have noticed when testing a set having a screen-grid stage that an adjustment to the aerial circuit may apparently affect the amount of the reaction?

You will notice this when the set has different aerial tappings or a condenser in the aerial circuit working as a volume control. First, adjust the reaction nicely, so that the anode circuit is just oscillating.

Then alter the aerial circuit in some way, such as by connecting the aerial to a different tap or changing the setting of the aerial condenser. The circuit may have to be re-tuned and you may find that the aerial circuit is now oscillating.

Actually, the aerial circuit is coupled to the anode circuit by the stray circuit couplings, including the tuning condensers, the coils, wiring and valve. When the aerial circuit is brought into tune with the anode circuit the aerial absorbs a little power from the anode circuit and the set is very sensitive when both circuits are just off the oscillating point.

If now the aerial tap or the value of the series condenser is altered, the load is changed. This affects the condition of the circuit which may now oscillate or be further from the oscillating point.

CHANGE THEM AND SEE!

USUAL values of grid condenser and leak resistance are .0003 microfarad and 2 megohms. In many cases better results are obtained when parts having lower values are fitted.

Thus the grid condenser can be reduced to .0001 microfarad. There will usually be no loss in sensitivity and in some cases there may be a slight gain. But the quality will usually be much improved. It is the higher notes that are strengthened and in many sets the circuits cut down the top notes with the result that a distinct improvement is noted.

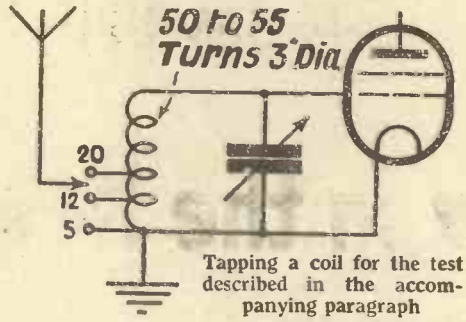
If the grid leak is lowered from the 2 megohms to say 1 megohm or even .5, the results from the point of view of quality will be still further improved. It is possible that the reaction circuit will need a little alteration when the values of the grid condenser and leak have been so reduced, but probably a change in the voltage of the high-tension will put this circuit right.

As a matter of fact, the anode voltage to the detector should always be as high as possible in order to reduce the chances of overloading. Detector overloading is responsible for much bad quality.

THESE TINY COILS

ARE large tuning coils doomed? One might think so if one considered the small size of many commercial coils.

A small coil used in an aerial circuit cannot produce as strong a signal across its ends as a larger coil, however, provided both are properly used. With a large coil, having the aerial connected to a tap or through a primary winding of a suitable size, the signal strength is bound to be greater than from a coil of smaller size.



Tapping a coil for the test described in the accompanying paragraph

A few experiments soon prove this. You can make a three-inch coil having 50 or 55 turns of No. 26 wire, taking taps at 5, 12 and 20 turns. Join it as in the accompanying sketch, using a .0005 microfarad tuning condenser.

Note the selectivity and signal strength using first the aerial tap at the fifth turn.

Next take the aerial to the twelfth-turn tap. The selectivity will not be quite as good, but probably the strength will be much greater.

Finally, take the aerial to turn 20. If tests are also made using a one-inch coil or coil of 1½ inches, the difference in the results will at once be noticed. The question of screening may turn one to the smallest coil that will do the job, but when screening is not essential a large coil is much to be preferred.

A POWER-GRID POINT

A QUESTION that is often asked is why does the anode current of a detector valve, working as a power-grid rectifier, or as an ordinary grid circuit rectifier, fall off when a signal is tuned in.

Briefly the current falls off because the grid goes more negative when a signal is brought in, and the stronger the signal the more negative is the grid made. Therefore, the anode current is reduced by the signal.

If you increase the bias applied to a power valve the anode current is reduced. The same thing happens with the detector or any other valve. As you increase the bias the current is reduced.

A weak signal makes the grid of the detector a little more negative, and so the anode current falls off a slight amount. A stronger signal still further lowers the voltage of the grid, making it still more negative, and this reduces the anode current still more.

The reduction in the anode current is an indication of the strength of the signals of the detector. A strong signal may reduce the current to a very low value. Distortion is bound to be introduced if the current is reduced to too low a value, and a pre-detector control must be fitted so that this can be avoided. The strength of the output depends upon the percentage of modulation. Do not therefore confuse the strength of the low-frequency output with the strength of the radio-frequency signal.

THE "MASCOT" MAINS UNIT

(*Continued from preceding page*)

The value of the power resistance chosen will, as I mentioned earlier in the article, depend whether you are using mains valves or battery valves, and, if you are using battery valves, on whether you are using the power or super-power types. There is no point in using anything but the super-power type when you have such a powerful mains unit as the additional high-tension costs you no more.

For the rectifying valve you can use either a Mulland DW2 or Cossor 506BU for the condensers you can use either a pair of 4-microfarads or two pairs of 2-microfarads. The low-frequency choke should be a good one and suitable alternatives are given in the list of components. So far as the resistance is concerned, this must be of the power type capable of carrying the full current. Do not be tempted to use spaghetti resistances which, while excellent for the purpose for which they are designed, are totally unsuited for carrying heavy current.

Operated from a unit of this description, the "Mascot" or any other set will be found much more powerful.

The "Mascot" mains unit is primarily designed, of course, for use with the "Mascot" receiver, which has only one high-tension tapping. Next week I will tell you how to use this unit with other receivers fitted with several high-tension tappings, and a screen-grid valve

Mr Percy Harris uses four!

LISSEN

Mansbridge Type Condensers in the P.W. Harris Mains Unit

This Lissen Mansbridge Type Condenser is specified by Mr. Percy Harris in the P.W.H. Mains Unit described in this issue. Keep closely to the specification for this component, for upon the reliability of the condensers you use depends the performance of the Mains Unit you build.

2 mfd. Price **3/6**

LISSEN FIXED MICA CONDENSERS

These Lissen Mica Fixed Condensers are leak-proof. They never vary. They deliver all their stored-up energy. Guaranteed accurate within 5% of marked capacity. Can be mounted upright or flat. Grid-leak clips included free with each condenser. .0001 to .001 .002 to .006, 1/6.

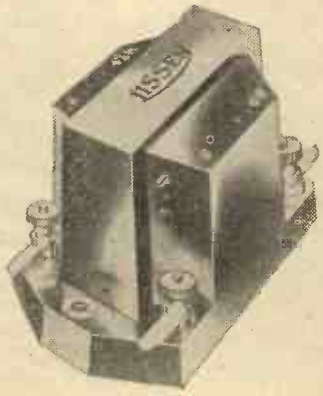
1/-

Lissen *again* in the New Regional 3

LISSEN

BAKELITE DIELECTRIC VARIABLE CONDENSER

This is a Lissen miniature precision variable condenser for coupling and reaction circuits. It is a well-designed and sturdily built component; the moving vanes are definitely located and inter-connected. For tuning, .0005 mfd For Reaction, .0001 and .0003 mfd. Price **2/6**



LISSEN

TOREX TRANSFORMER

This Lissen Torex Transformer makes a big cut in the cost of any set without sacrifice of quality. It is a high-grade silicon steel core transformer, giving remarkably even amplification over the whole band of audible frequencies. A neat, compact component; its moulded bakelite case is hermetically sealed and completely insulates the windings. Proof against shorting, leakage or moisture. **5/6**

When the specification says LISSEN - *stick to LISSEN!*

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

SETS OF DISTINCTION

The MARCONIPHONE SUPER-TUNED PORTABLE FOUR

Makers: The Marconiphone Co., Ltd. Price: 13 Guineas

ONE of the most pleasing portables of the upright cabinet type tested this season is the Marconiphone model shown by the illustrations. At least, I think so, and I have had the set on for a long week-end without finding anything to complain about.

You may take it that this portable represents the very best in modern technique, giving a performance that would be creditable in a much more cumbersome installation. And when you realise how compact and convenient is the walnut cabinet of this portable, which houses everything needed for broadcast reception, the attraction is still more enhanced.

A Neat Design

As soon as you open the back of the cabinet, and take stock of the interior, you cannot help appreciating the neatness of the design. I suppose the general layout would be considered conventional. There is a four-valve chassis at the top, notable for the generous amount of metal screening. Below is space for the batteries, which comprise the usual 108-volt high-tension unit of standard capacity, a non-spillable two-volt accumulator and a 9-volt grid-bias battery.

These batteries are firmly wedged into the compartment, and there is no chance of any of them coming adrift, even with fairly rough transportation. One of the features of the set is the use of three metallised valves, only the power valve being non-metallised.

The first valve is a Marconi S21 screen-grid, followed by a Marconi HL2 detector. This is coupled to another HL2 for the first low-frequency amplifying stage. Then comes the power output, which is a Marconi PT2 pentode—an ideal valve for a portable, since it gives ample output without too great a drain on the high-tension battery.

Small Current Requirements

I have checked up the total anode-current consumption, which is just under 10 milliamperes—not at all excessive in view of the ample undistorted output. The high-tension battery should last two or three months with average use.

Although entirely self-contained, this set has provision for the external connection of a loud-speaker, for a gramophone pick-up, and for an aerial and earth.

The self-contained loud-speaker is of the balanced-armature cone type, giving a very pleasing response. Speech is particularly good, and there is an entire absence of "woofiness," even when listening to foreign stations.

Music comes through with a satisfying all-round tone, and up to the ample limit of the pentode power valve there is no sign of distress. For loud reproduction I found it necessary to make a slight adjustment to the loud-speaker unit, there being a neat knurled knob fitted for this purpose on the grille at the front of the cabinet.

Simple Control

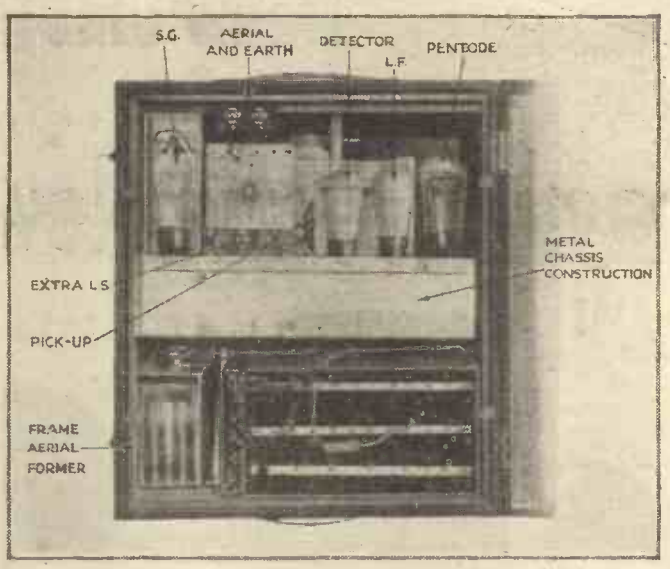
Here also we find the controls, which are as well thought out as the chassis, which is saying a good deal. At the top is the tuning escutcheon, with a dial clearly marked in wavelengths for medium- and long-wave bands.

This scale is worked by the knob on the right, which also controls the two-gang condenser. There is a trimmer knob at the centre, and reaction is controlled by a knob on the left.

By far the neatest of the controls is the knob controlling the wave-change and battery on-off switching. This is located below the main controls just mentioned, and in addition to working the three-position switch this knob actuates a scale, which clearly shows which circuit is in use, that is medium waves, long waves or "off."

After a weekend with the set I am convinced that the operation is essentially simple, in spite of the number of knobs. Actually there are no superfluous controls, all those incorporated being essential to the efficiency of the performance.

True to its name, the tuning of the Marconiphone portable is "super"—at least for the type of set. The two London stations were readily eliminated, and I was able to get plenty of foreigners clear of interference. On the long waves Radio Paris was absolutely clear of Daventry, and was indeed a very powerful signal.



This picture shows the salient features of the Marconiphone Portable Four

Directional Selectivity

By taking advantage of the directional effect of the frame aerial, I was able to get Zeesen almost clear of both Radio Paris and Daventry. The set appears to be equally good on both wavebands.

Although of the upright type, this set is very convenient to carry around. There is a strong handle on the top of the cabinet, and a turntable under the base.

SET TESTER.

A West Country programme will be given from Cardiff on July 14 when a West Country one-act play by Laurence Housman, entitled *The Called and the Chosen*, will be heard.

On July 14, Ulster listeners are to hear the first relay of light music from the Slieve Donard Hotel, Newcastle. This music will be broadcast from the main lounge of the hotel, and will be played by Sibbald Treacy's Slieve Donard Orchestra.

A folk-song programme will be given by the Western Studio Orchestra for West Regional listeners on July 12.

The United Methodist Conference is being held this year in Zion Church, Kingswood, Bristol, in July and on July 10 a service will be relayed from the Church to West Regional listeners.

A weekly review of new components and tests of apparatus conducted by J. H. Reyner, B.Sc., A.M.I.E.E.

NEW ATLAS TRANSFORMER

THE Atlas transformer which we have received for test is interesting in having one of the smallest iron circuits we have yet seen. A steel of very high permeability has obviously been employed, since there are only four laminations in the core.

The coils appear to be of the cotton interweave type impregnated after winding, which gives immunity from breakdown due to moisture and similar causes.

The whole is housed in an attractive green bakelite case, measuring 3 in. by 1¾ in. by 2 in. high.

The instrument is said to be suitable for either direct or parallel feed. With the parallel feed connection we obtained a response as shown on the accompanying curve. The primary inductance with no

A new low-frequency transformer by Atlas

D.C. flowing was 43.5 henries, the value dropping to 5 with 2 milliamps D.C.

GOLTONE MAINS CONNECTOR

IT is most important that a good shock-proof mains connector should be used between the supply mains and the receiver or battery eliminator. This is, of course, normal in the case of commercially-made apparatus, but is not always so in amateur-made apparatus.

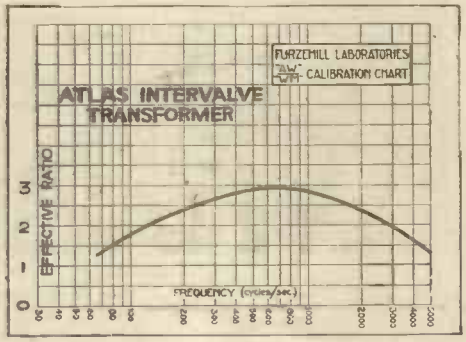
A well-made baseboard-mounting plug and socket connector is that made by Messrs. Ward & Goldstone, Ltd., and known as the "Goltone" Mains Connector. In this connector the socket, which is of black or brown moulded bakelite, takes the place of the usual plug on the end of the connecting cable, while the plug is made for baseboard mounting in the actual receiver itself.

In this way when the socket is removed it is impossible, normally speaking, to obtain a shock from the mains, as the pins of the plug are then dead. If it is required to mount the plug directly on to the receiver, it can be very simply removed from the small metal bracket with which it is sold.

The socket connector retails at 8d., and the two-pin plug at 10d., and they can be recommended for general use.

BRYCE MAINS TRANSFORMER

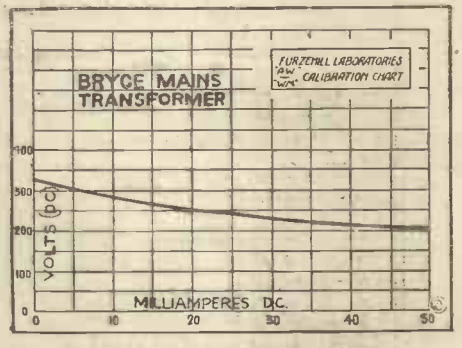
A MAINS transformer of the stripped type without the usual terminal board is often useful. The Bryce type AB250 is intended for general average use.



Response curve obtained with the Atlas transformer on parallel feed

In addition to the tapped primary winding, three secondary windings are provided, the high-tension winding and two low-tension windings, one of which is suitable for the valves of the receiver and the other for the rectifying valve. All these windings are, of course, centre tapped.

The transformer was wired into a rectifying circuit, the valve employed being a U12 type with a 4-microfarad reservoir condenser.



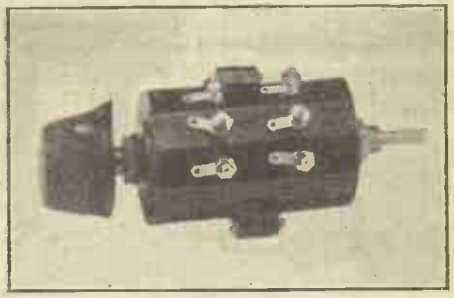
Voltage variation curve of Bryce AB250 transformer

On open circuit the high-tension voltage was 240 + 240 volts, while the low-tension voltages were 4.2 and 4.3 volts. With a D.C. load of 30 milliamperes the D.C. output voltage was 234. The actual variation of the D.C. voltage with direct current load can be seen from the chart with this report.

The output voltage of the low-tension windings was in each case 3.8 volts on load, the load being respectively 2 and 3 amperes. With all the secondary windings open-circuited, the power consumed was only 1.8 watts, giving an efficiency of the order of 95 per cent. under normal working conditions.

WEARITE POTENTIOMETER

AN interesting wire-wound potentiometer which we have tested this week is that made by Messrs. Wearite. This potentiometer is built up in a moulded bakelite casing which is provided with lugs to enable it to be mounted on the baseboard. At the same time the potentiometer is suitable for single-hole fixing on the panel in the usual way. The resistance element, which is either plain or



One of the new Wearite components—a ganged dual potentiometer

graded as required, is wound on a strip of fibrous material.

The moving arm, which is spring controlled, is interesting in that the actual contact is made by means of a small brass roller. In this way there is no rubbing on the very fragile resistance wire, and a long life is ensured. The potentiometer under test had a resistance of 25,000 ohms, but values up to 100,000 ohms may be obtained.

Provision is made for ganging two such volume controls together, a detail which is sometimes useful, as for example in a receiver using variable-mu valves and having in addition to the volume-controlling facilities thus afforded, an auxiliary control on the aerial circuit. The volume controls are well made and can be recommended for general use.

A concert party new to the microphone will be heard by North Regional listeners on July 7; these are the Arcadian Follies from the Victoria Pier, Blackpool.

RADIOGRAMS

A RECITAL of music by de Severac will be broadcast by Michael Mullinar in the Midland Regional programme on July 3.

General Higgins, leader of the Salvation Army, is to attend a luncheon given in his honour by the Salvation Army at Fishmongers' Hall on July 5. The General's speech will be relayed in the National programme.

Philip Ridgeway returns to the microphone on July 19, with a new programme under the old title of the Ridgeway Parade. On that date it will be heard by National listeners and will be repeated in the Regional programme on July 20.

An organ recital by Henry C. Hodgson will be relayed from St. Mary's Church, Nottingham, to Midland Regional listeners on July 4.

A farce by F. Morton Howard, entitled "Future Arrangements," will be given by Midland Regional artistes on July 5.

A recital of gramophone records of Birmingham artistes will be heard by Midland Regional listeners on July 8, when the programme will be presented by Robert Tredinnick.

The B.B.C. is planning to link up schools in the North of Scotland and the most remote rural districts in the Western Isles with the National wireless talks on educational subjects. The problem in these districts, of course, is that of reception, and it is understood that if Education Committees object to the expense, the B.B.C. may be willing to loan sets.

Ronald Frankau and his Frankau-Optimists will be relayed from the Grove Park Pavilion, Weston-super-Mare, in the West Regional programme on July 6.

Mr. John Davies gives a talk for West Regional listeners on Welsh Pioneers of Wireless on July 8. Mr. Davies, recalls the part that his tug-boat *May* took in the experiments by Marconi between Lavernock Point, Brean Down and Flat Holm.

The Mission to the Out-door Blind for Glasgow and the West of Scotland has now increased the number of wireless installations granted to blind persons to 1,441. The Mission received an allocation of 200 single-valve sets from the British Wireless for the Blind Fund, and most of these have been installed.

The recently issued B.B.C. pamphlet "Scotland Calling," announced that a regular series of feature programmes would be included in the summer and early autumn. A Chaumer concert has been arranged for July 2. These "Chaumer" concerts used to be a favourite entertainment of the farm labourers of Aberdeenshire when they gathered round their bothy fire after the day's work was done.

The first of a new series of summer dramatic programmes for West Regional listeners will be given on July 1, under the title of *Summer Laughter*.

BROADCAST ARTISTES in PICTURE

JACK HYLTON.—Leader of his famous dance orchestra

ESTHER COLEMAN.—She has broadcast for the B.B.C. nearly 180 times

HORACE STEVENS. — Well-known in connection with the symphony concerts at Queen's Hall

FREDERICK LAKE.—First broadcast early in 1924

SIR FORBES ROBERTSON.—The famous English actor, who broadcasts although he has retired from the theatrical world

ANNE THURSFIELD (below). One of the first of the noted classical singers to broadcast

LILIAS MACKINNON.—A popular solo pianist

WALTER TODD (left).—Humorist and entertainer

JELLY D'ARANYI.—She was heard at a recent Sunday studio concert

A PLEA FOR MORE OPERATIC CONCERTS

By Whitaker-Wilson

IT is a mistake to classify grand opera as highbrow; before the advent of wireless it was not so considered. I know several people who used to go regularly to Covent Garden more or less because it was "the thing" to go; I expect you also know that type of person.

Even though admittedly the initial attraction was Covent Garden in the height of the opera season, these people did not find opera too much for them. The music itself, in many cases, was a little lofty, perhaps; on the other hand, there were the dresses, the scenery, and (above all) the acting and the actors' voices to compensate. And so opera flourished because quite ordinary intelligent people could appreciate it.

I think I am not far wrong in suggesting that only a small percentage of regular opera-goers have ever been equally regular symphony-goers. An audience at a symphony concert, or one of the Proms, is very different in character. Apart from the absence of a show of actual fashion, symphony-goers are usually a trifle more advanced in music.

It is quite one thing to sit out an opera, with all the help one receives from what one actually *sees* as well as hears; it is quite another to sit out a concert of symphonic tone-poems and concertos where there is so much less to see. When it comes to a matter of listening to an opera or a symphony concert *by wireless*, the chances of their being appreciated are much more equal *because one sees nothing in either case*. From that I am inclined to argue that an operatic broadcast does opera harm so far as the average listener is concerned.

If that listener has never seen an opera he is bound to regard the music he hears in much the same light as he would regard the performance of a choral work—as a medley of voices and orchestra.

If he has seen an opera, and hears part or the whole of it broadcast, he is probably going to find himself a little confused because he is saying to himself: "Let me see; what are they *doing* on the stage *now*?" That sort of thing does not help the beginner who is striving to appreciate Art.

I asked some time ago for more and more operatic concerts, by which I meant—and still mean—that excerpts, rather than entire scenes or acts, should be rendered in the studio. Here there is no question of scenery and the consequent strain of attempting to visualise while listening; moreover, it does not matter where one is in the story. The whole effect is a song or a duet—sung in English, of course—care having been taken to choose excerpts that will carry conviction. Such concerts have already been given, and with great success. What I hope the B.B.C. will do is to increase the number and give a series—like the Sunday night symphony concerts—in which a definite plan is adopted with the direct intention of popularising opera by cutting parts where there is too much plot (which generally means recitative) and keeping to the more plain-sailing scenes.

My idea is that the B.B.C. shall, by a definite series of broadcast operatic concerts, popularise and familiarise each of the best-known operas.

At a concert in the Winter Gardens, Cheltenham Spa, by the Cheltenham Municipal Light Orchestra on July 13, songs will be given by Alfred Butler.

Archie Wallen's Concert Party presents "Farce," a farcical fantasy of fun from the Jephson Gardens, Leamington Spa on July 15, and their programme will be relayed on the Midland Regional wavelength.

An important Shakespearean production will be broadcast from Belfast on July 15, when *As You Like It* is presented. Owing to the length of the play, certain "cuts" have been made, but in the main the essentials of the play have been preserved. Incidental music will be played by the Radio Septet.

IMPROVING DETECTOR EFFICIENCY

WHEN a valve manufacturer changes the characteristics of a certain valve, we are accustomed to find that the new characteristics have values which are generally supposed to represent a higher efficiency than the original valve type.

Yet the Mullard Company have recently announced revised data for their 904V indirectly-heated detector valve from which, on the face of it, the new valve appears to be less efficient than the earlier form of the same valve.

There must be some very good reason why a valve having a slope of 2.2 milliamps per volt should be substituted for one having the very high slope of 6.5 milliamps per volt.

When sought out and finally tracked down, the explanation is reasonable enough, and understandable. But as it upsets many pre-conceived notions of what the characteristics of an efficient detector should be, a simple statement of the facts of the case may be of interest. In the first place, it must be remembered that in detection we are dealing primarily with radio-frequency energy, and that at radio frequencies very small condenser capacities have comparatively great effects on the behaviour of a circuit. A three-electrode valve forms, in itself, a complicated electrical network equivalent to an arrangement of very small condensers and resistances, the "plates" of these condensers being the electrodes of the valve.

Of these small condensers, the most important is the one formed by the grid and anode because it acts as a link between the anode and grid circuits. The effect of the grid-anode capacity is equivalent to that of a condenser of much greater capacity connected between the grid and cathode, and the greater the effective amplification of the valve, the greater will be this "reflected" capacity.

What are the practical results of this capacity shunting the grid circuit of the valve? The chief result is that it provides a path whereby part of the energy in the grid circuit, which should be available to excite the grid and so produce a high degree of effective amplification, is dissipated and wasted. Moreover, the existence of this "reflected" capacity changes the effective tuning capacity and upsets the ganging of the condensers. This effect is known as the "Miller" effect, and its extent depends, as we have seen, on the frequency of the signals handled, upon the value of the inter-electrode capacity of the valve, and upon the effective amplification factor.

Now in designing an indirectly-heated detector valve to have a high value of mutual conductance, which means in effect, a high stage gain and comparatively low impedance, it is necessary to reduce to the minimum the distances between the electrodes. This means two things: first, that the inter-electrode capacities are bound to be of considerable magnitude, and second, that the impedance of the grid-cathode path within the valve will be comparatively small. The one will increase the losses due to "Miller" effect, and the other will increase the damping due to the flow of grid current. The combination of these phenomena is equivalent in effect to an impedance shunted across the grid circuit or input circuit of the valve, and is therefore usually known as the input impedance.

The sum of these losses is thus dependent not upon the simple value of the mutual conductance of the valve, but it varies approximately as the square of the mutual conductance. While, therefore, the production of high-slope detectors is intended to give extreme sensitivity, that is to say a large modulation output voltage for a given signal voltage, the extent to which the slope can be increased with advantage is limited by the increasing losses due to input impedance.

Postcard Radio Literature

GET THESE CATALOGUES FREE.

Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them FREE OF CHARGE, just send a postcard giving the index numbers of the catalogues required (shown at the end of each paragraph) to "Postcard Radio Literature," "AMATEUR WIRELESS," 58-61, Fetter Lane, E.C.4. "Observer" will see that you get all the literature you desire.

That Aerial Equipment

NOW that the fine weather is here it is time to overhaul your outdoor aerial equipment. As the first step in this direction, get the sheets issued by J. J. Eastick and Sons describing the new combined knife switch, lead-in tube, and lightning arrester. The whole outfit is obtainable in various sizes. **787**

G.E.C. Meters

Here's the latest G.E.C. booklet, a handy eight-page production (Publication M6160) describing measuring instruments for all kinds of radio jobs. They are not at all expensive and have a laboratory standard of accuracy. Some of the smaller types can very well be mounted on the panel or on the cabinet front of a set. **788**

New Tekade Speaker

I have just received details of the new type S 40 balanced-armature speaker unit introduced by Tekade Radio and Electric, Ltd. It is tapped to match the impedance of the windings with the valve output and can be obtained either in chassis or complete cabinet form. Incidentally, it is a British-made job. OBSERVER **789**

REGINALD FOORT ON

BROADCASTING FROM THE CINEMA

Reginald Foort, F.R.C.O., the popular broadcast cinema organist, tells how he arranges his organ broadcasts

Reginald Foort at the console of a big cinema organ. The microphone at the right is for "talkie" recording

WHEN I met Mr. Reginald Foort after one of his popular Regal broadcasts he was busy checking over technical details of a new idea of his for cinema organ broadcasts. This may come into practice in connection with forthcoming broadcasts, but at the moment it is strictly "hush hush."

Foort is certainly the most enthusiastic cinema organist in the country. In chatting, he reminded me of the old New Gallery days of 1926 when he first popularised organ broadcasting from that well-known West End cinema.

The Early Broadcasts

It was more or less the result of an accident that organ broadcasts of that kind were ever given in this country. Fred Kitchen had a large orchestra at the New Gallery in those days and the B.B.C. experts went round to make a test for an orchestra broadcast once a week. They arrived early and happened to hear Foort practising on the organ.

They realised what a novelty that organ would be in the broadcast programmes, so it was arranged that Foort should broadcast once a week from 5 to 5.15 p.m.

The broadcast was an instantaneous success: so many enthusiastic letters were received that Foort was soon asked to broadcast for a whole hour each week instead of only fifteen minutes; later on, occasional evening broadcasts were also arranged.

"The B.B.C. engineers fix up the amplifiers in one of the dressing rooms and plug into the Reisz microphones which are permanently installed in the theatre. A separate flex is permanently wired up to the console and an indicator light connected. When the announcer in the studio has finished, he touches a button which signals the control men to flash the red lamp, and then I start.

Organ Broadcasting Technique

"After leaving the New Gallery I went down to a very fine organ at the Regent, Bournemouth. Here the broadcast went over specially installed lines from the theatre to Bournemouth control room and thence over ordinary Post Office trunk telephone lines via Southampton to London. The Post Office treated my broadcast as an ordinary trunk call lasting an hour, and it cost the B.B.C. about £10 for lines alone every time I broadcast. Owing to the number of repeaters and line amplifiers *en route*, there was frequently considerable difficulty in keeping the lines free of intermittent humming and other line noises.

"On one occasion a gale cleared away a long section of 'phone line and it was over a fortnight before I was able to broadcast again.

"The B.B.C. engineers twice rejected the organ in the Regal, Marble Arch, as unsuitable for broadcasting, so when I went there I had thirty-seven alterations made by the builders and then, I am glad to say, it was O.K. As the organ was in use in the cinema every day, these alterations had to be carried out during the night. The work took eight weeks and was finished on Christmas Day, when I gave my first broadcast on this organ, so there was no time to try it or practise on it. It was an eerie experience sitting alone in the theatre, on Christmas Day, of all days, playing to millions of listeners."

There is a small check wireless receiver in Foort's own room at the theatre, and he told me he listens on this to many organ broadcasts.

"It is a pity that the B.B.C. have not a good studio organ," he said. "Some of the foreign stations are much more fortunate. There is a good organ in the main studio at Munich, I am told, and in one of the Hilversum studios there is a fine three-manual 'Standaart' specially designed for broadcasting.

"There are many obvious difficulties in the way of broadcasting on an organ in a theatre. In most cinemas the pipes are a hundred feet or so above the organist's head, so that the sound is thrown straight out into the theatre, through a tunnel above the proscenium arch. In one theatre I was in one got the effect of playing with cotton wool in one's ears, so it was difficult to hear just what was going on. The microphones are usually hung up in front of the acoustic tunnel so that they 'hear' in the same way as the audience in the theatre. The organist down below can only judge what it sounds like, up above. There are so many snags which ordinary listeners don't appreciate.

"The popular American organist, Jesse Crawford, has a splendid three-manual organ, specially designed and built for recording and broadcasting in a studio. He broadcasts on this and gramophone records made with it are on sale over here. It must be gratifying to be able to broadcast and make records under such ideal conditions."

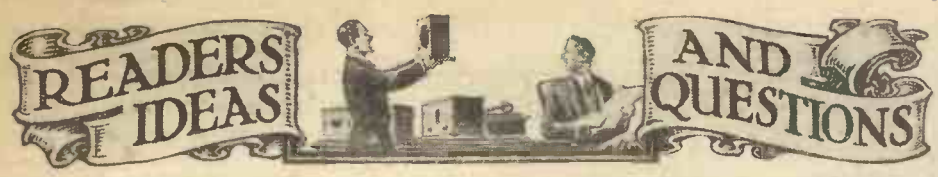
IN THE AMPLIFIER ROOM

At the amplifier panels of the recording gear in a cinema used in connection with Reginald Foort's organ records and broadcasts

UP-TO-DATE RETAILING

SET builders in London will be interested to know that new premises have been taken by Messrs. Districts Supplies, Ltd., of 256-258 and 260 Bishopsgate, London, E.C. There are six separate soundproof demonstration rooms and sets and components can be tested under ideal conditions. Of particular interest is a special opening offer competition, in which sets and radio-grams figure in the prize list.

Memories of Terry's, the Apollo, Shaftesbury, Gaiety, Daly's, Coliseum and Drury Lane are enshrined in a National programme of July 5 entitled "Thirty Years of Musical Comedy."



Loud-speaker Cracklings

SIR,—A permanent-magnet moving-coil speaker, which I added recently to my receiver, has now developed crackling noises during reception. I have reverted to my original cone-type speaker temporarily and find this does not give rise to the crackles. It would seem, therefore, that the crackling originated in the new speaker. Can you help me? A. D. (Doncaster).

It would appear that the moving-coil in your speaker has got out of centre and is rubbing against the walls of the magnet. If your speaker has a centring adjustment device you should find it a simple matter to loosen the centring nut or screw and re-centre the coil. If you do not feel equal to the task, we advise you to return the speaker to the makers for re-adjustment.—ED.

Voltmeter and Ammeter Tests

SIR,—I have been endeavouring to discover a fault in my receiver which is supplied by an accumulator for L.T. and a mains unit for H.T. I first tested the output voltages from the mains unit and found that the maximum voltage available was 120 volts. The output is supposed to be at least 150 volts. This I remedied by changing the tapping on the mains transformer from the 110-volt tapping to the 135-volt tapping. The output now indicated by the voltmeter is about 160 volts. Nevertheless, I still fail to obtain reception and must conclude I still have a fault which cannot be traced with my meter. Can you assist me in this matter, please?

B. L. (Leeds).

Testing the output voltages of the mains unit only indicates that the mains unit is in good order. The voltage readings you obtain are not accurate and are doubtless in excess of what you imagine them to be. We do not recommend you to use a voltmeter, unless it has an internal resistance of at least 1,000 ohms per volt. If you want to test your set to discover the fault, you should get a milliammeter and check the current consumption of each individual valve. The test may be carried out by disconnecting the wire normally connected to the anode terminal of the valve under test and joining this wire to the positive terminal of the meter. A further wire from the negative terminal of the meter should then be connected to the anode terminal of the valve under test. When the receiver is switched on the current flowing in the anode circuit of the valve should be indicated by the meter. If no reading is indicated, no anode current is passing. The components throughout the anode circuit of the valve should then be tested for continuity. If the components are in good order, the valve itself may be faulty. The voltages on the anodes of the valves must be correct if the current consumption of the valves, as indicated by the milliammeter, is correct. The milliammeter test of a valve circuit is almost an infallible one.—ED.

Receiver Building and Patents

SIR,—I understand that the more important patents in regard to wireless have lapsed and that it is now possible to make up a straightforward receiver for sale without paying royalty. Can you advise me whether I am correctly informed or whether it is still not possible to manufacture a wireless receiver without paying royalty. R. McT. (Fife.)

It is very unlikely that you will be able, even now, to make up a receiver which does not infringe some patent or other. Although certain patents have expired, there are still many in existence. The whole question is one calling for a complete knowledge of the patent position and we think your best plan would be to employ an agent who is conversant with this.—ED.

The Regional Scheme and the Highlands

SIR,—As a reader of your periodical since its beginning, I was interested to read Mr. Alan Hunter's article on the B.B.C.'s latest plans. Mr. Hunter states: "Now, we are up against the fact that to complete the Regional Scheme there are not enough wavelengths." Exactly! The Regional Scheme is the root cause of the lack of wireless reception in the Highlands, and other parts of Great Britain. The B.B.C. have cut their coat without the necessary cloth, and their so-called finished article is a misfit.

We in the Highlands have been agitating for the past nine months for a Regional transmitter to provide for local programme material. The B.B.C. refuse to give us a Regional transmitter, because they have used up their wavelength elsewhere, without having previously considered the requirements of Great Britain as a whole.

This argument has been strongly represented to the B.B.C. in the course of the Highland agitation of the last nine months. I have already proposed to the B.B.C. we have enough medium wavelengths with which to cover the whole of Great Britain with Regional programmes if they will use Daventry 5 X X as the sole transmitter of National programmes. The new and more powerful Daventry will cover the whole of Great Britain, and when this new transmitter is complete we shall have three medium wavelengths to spare for use as Regional transmitters. This plan would give the Highlands, north Wales and other parts presently blank all they require.

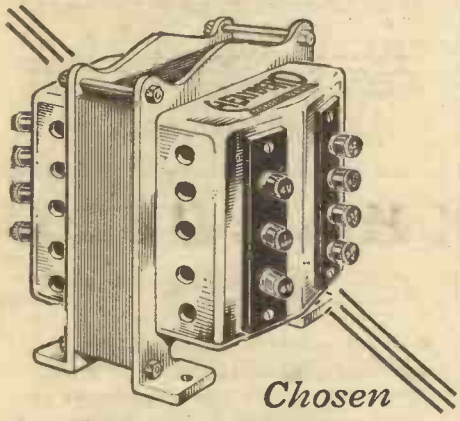
But for their stupidity and lack of vision, the B.B.C. would have had this plan in operation long ago. Their present scheme is deplorable and displays a constructive plan of very poor merit.

ANDREW MURRAY, Provost, Town House, Dingwall.

A Really Wonderful Set

SIR,—I should like to add my appreciation of a really wonderful set—the "Simple Super." It's quite a poor night if I cannot get between fifty and sixty stations at full strength. Mr. James said the set gave him a good deal of pleasure to design, but this must be nothing to the pleasure of the many builders. It's the best set I've ever constructed.

A. W. T. (London).



Can the Highlands Expect Better Broadcasting?

ALTHOUGH it is an indubitable fact that Falkirk will provide most of Scotland with a greatly improved service of broadcasting—far better signal strength and better variety of programmes—we must not overlook the limitation in the range of medium-wave stations, no matter how high the power.

It is true that the great bulk of Scotland's four million odd inhabitants dwell inside the reliable service area of the Falkirk stations, or will come within the service of the Aberdeen relay. But there is a minority, getting on for a million people, who are outside the service areas of Falkirk and Aberdeen, and these Highlanders are "kicking" at conditions.

I understand that the number of licences inside the service areas just mentioned totals 212,292, which does not seem a very high figure. But we must remember that regional high-power broadcasting has hardly begun in Scotland.

Meanwhile, of the potential listener market in the Highlands, there are at present only 27,039 licencees. The pertinent question of the moment is whether this meagre section of the total licencees of Scotland can be expected to expand.

From recent reports on the situation, as issued by the B.B.C., it is obvious that the problem is at present unsolved.

One of the biggest hopes of the future lies in the increased power of the Daventry long-wave station, which, on 120 kilowatts, at its Droitwich site, should penetrate even to the Highlands with a reliable signal bearing the National programme.

Various suggestions have been made to the B.B.C. for covering Scotland with a better signal than has been obtained so far, and the officials have carefully examined the most attractive of these suggestions—without finding any solution.

The first suggestion, and one very widely expressed, is that Daventry should be moved nearer to Scotland—not the place, but the high-power long-waver! It is pointed out that the best strategical position for our long-waver is in the centre of England, so that it covers the most densely-populated areas.

But even with the new high-power long-waver in the Droitwich site, the greatly improved aerial system and the higher power will mean a materially better signal in the north of Scotland.

Another suggestion is that the power of the Aberdeen station should be increased, and that it should be put back on its old wavelength. The answer to this suggestion is that no matter what medium wavelength the Aberdeen station might work on, even a power of 50 kilowatts would not provide a reliable service in the complaining areas.

Still another suggestion, again based on erroneous technical ideas, is that the power of the Falkirk transmitters should be increased. The limitation in the service area of a medium-waver is determined not so much by the power as by the night fading, which would occur long before the Highlands were reached, even with considerable power increase.

Although there does not seem any immediate hope of improving the lot of the Highlander, apart of course from the imminent increase in Daventry's power, we should not lose sight of the fact that the B.B.C. has to provide a service for the whole of the British Isles; and in view of the limited number of wavelengths population figures must be taken into account when considering the distribution of the stations.

A. S. H.

WHEN SUBMITTING QUERIES

Please write concisely, giving essential particulars. **A Fee of One Shilling** (postal order), a stamped addressed envelope, and the coupon on the last page must accompany all letters. The following points should be noted.

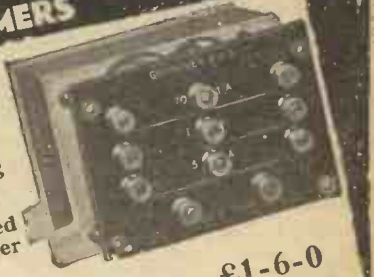
Not more than two questions should be sent with any one letter.

The designing of apparatus or receivers cannot be undertaken.

Modifications of a straightforward nature can be made to blueprints, but we reserve to ourselves the right to determine the extent of an alteration to come within the scope of a query. Modifications to proprietary receivers and designs published by contemporary journals cannot be undertaken.

Readers' sets and components cannot be tested at this office. Readers desiring specific information upon any problem should not ask for it to be published in a forthcoming issue, as only queries of general interest are published and these only at our discretion. Queries cannot be answered by telephone or personally.

Readers ordering blueprints and requiring technical information in addition, should address a separate letter to the Query Department and conform with the rules.



BROADCASTING STATIONS

Broadcasting Stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is that of the carrier wave.

Kilo-Metres	cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (GSSW)	10.0
211.3	1,420	Newcastle	1.2
214.3	1,400	Aberdeen	1.0
242.3	1,238	Belfast	1.0
261.0	1,147	London Nat.	50.0
288.5	1,040	Swansea	0.12
288.5	1,040	Plymouth	0.12
288.5	1,040	Bournemouth	1.0
288.5	1,040	Scottish National	50.0
288.5	1,040	Newcastle (temp.)	1.0
311.5	993	North National	50.0
309.9	968	Cardiff	1.0
355.9	843	London Regional	50.0
370.4	797	Scottish Regional	50.0
398.9	752	Midland Regional	25.0
480	625	North Regional	50.0
1,554.4	193	Daventry (Nat.)	30.0
AUSTRIA			
218	1,373	Salzburg	0.5
245.9	1,220	Linz	0.5
285.2	1,053	Innsbruck	0.5
352.1	852	Graz	7.0
453.2	662	Klagenfurt	0.5
517	581	Vienna	15.0
also testing on 1,253.3 m. from 7.0 p.m. (Mon., Wed., Sat.).			
BELGIUM			
207.3	1,447	Franchimont	0.2
209	1,435	Antwerp	0.4
210.1	1,428	Liege (Seraing)	0.15
215.3	1,393	Chatelineau	0.2
215.5	1,392	Bruxelles Conference	0.2
215.5	1,392	Liege	0.1
220	1,364	Binche	0.3
230.3	1,304	Radio Wallonia	0.3
241.5	1,241.8	Liege (Exp.)	0.1
245.9	1,220	Radio Schaerbeek	0.3
260.3	1,114	Liege (Cointe)	0.4
283	1,060	Brussels (SBK)	0.5
337.8	888	Brussels (No. 2)	15.0
509.7	558.4	Brussels (No. 1)	15.0
BULGARIA			
318.8	941	Sofia (Radno Radio)	1.0
CZECHO-SLOVAKIA			
58	5,172	Prague	0.5
249.6	1,201.8	Prague (2)	5.0
263.8	1,137	Moravska-Ostrava	11.0
279.3	1,074	Bratislava	14.0
293	1,022	Kosice	2.5
341.7	878	Brunn (Brno)	35.0
488.6	614	Prague	120.0
DENMARK			
281.2	1,067	Copenhagen	0.75
1,153	260	Kalundborg	7.5
also on 31.51 m. (9,520 Kcs.)			
ESTONIA			
298.8	1,004	Tallinn	11.0
465.8	644	Tartu	0.5
FINLAND			
291	1,031	Viipuri	13.0
368.1	815	Helsinki	12.0
555.5	542	Tampere	1.0
1,796	167	Lahti	54.0
FRANCE			
220	1,363.7	Béziers	0.5
222.4	1,348.6	Fécamp	10.0
236.2	1,267	Bordeaux-Sud-Ouest	2.0
249.6	1,201.8	Juan-les-Pins	0.5
254.7	1,177.2	Toulouse (PTT)	1.0
265.4	1,130	Lille (PTT)	1.3
271.4	1,105	Rennes	1.2
286	1,049.1	Montpellier	0.8
279.5	1,073	Radio Lyons	10.0
293.7	1,021.5	Limoges (PTT)	0.5
304.9	984	Bordeaux (PTT)	13.0
308.6	972	Radio Vitus	1.0
also on 43.75 m. (6,865 Kcs.)			
315	950	Marseilles	1.6
329.7	910	Poste Parisien	85.0
345.2	869	Strasbourg (PTT)	11.5
370.4	810	Radio LL (Paris)	1.0
also on 33m. (9090 Kcs.)			
384.4	779	Radio Toulouse	8.0
447.1	671	Paris (PTT)	0.7
465.8	644	Lyons (PTT)	1.5
566	530	Grenoble (PTT)	2.0
1,445.7	207.5	Eiffel Tower	13.5
1,725	174	Radio Paris	75.0
GRAND DUCHY of LUXEMBURG			
1,250	240	Luxemburg (temp.)	1.0
GERMANY			
19.737	15,200	Zeesen (DJB)	8.0
31.38	9,560	Zeesen (DJA)	8.0
217.1	1,383	Königsberg	0.9
218	1,373	Flensburg	0.6
232.2	1,292	Kiel	0.25
238.9	1,256	Nürnberg	2.0
245.9	1,220	Cassel	0.25
253	1,184	Gleiwitz	5.0
259.3	1,157	Leipzig	2.0
269.8	1,112	Bremen	0.2
276.5	1,085	Heilsberg	60.0
283.6	1,058	Magdeburg	0.5
283.6	1,058	Berlin (E)	0.5
283.6	1,058	Stettin	0.5
318.8	941	Dresden	0.25
325	923	Breslau	60.0
360.5	832	Mühlacker	60.0
372.2	806	Hamburg	1.5
389.6	770	Frankfurt	1.5
389.6	770	Leipzig (testing)	120.0
419.5	715	Berlin	1.5
453.2	662	Danzig	0.5
472.4	635	Langenberg	60.0
532.9	563	Munich	1.5
559.7	536	Kaiserslautern	1.5
559.7	536	Augsburg	0.3
566	530	Hanover	0.3
569.3	527	Freiburg	0.25
1,634.9	183.5	Norddeich	10.0
1,634.9	183.5	Zeesen	75.0
2,525	119.3	Königswusterhausen (press)	15.0
2,900	103.5	ditto	
4,000	75	ditto	
HOLLAND			
296.1	1,013	Hilversum*	8.5
1,071.4	280	Scheveningen-Haven	10.0
1,875	160	Huizen	8.5
*20 Kw. Station testing			
HUNGARY			
211.2	1,417	Budapest (2)	3.0
550	545	Budapest (1)	18.5
ICELAND			
1,200	250	Reykjavik	21.0
IRISH FREE STATE			
224.4	1,337	Cork (6CK)	1.2
413	725	Athlone	60.0
ITALY			
25.4	11,810	Rome (2RO)	15.0
247.7	1,211	Trieste	10.0
273.7	1,096	Turin (Torino)	7.0
280	1,071	Bari (testing)	20.0
312.8	959	Genoa (Genova)	10.0
318.8	941	Naples (Napoli)	1.5
331.5	905	Milan	7.0
368.1	815	Bolzano	1.0
441	680	Rome (Roma)	50.0
500.8	599	Florence (Firenze)	20.0
526	570.3	Palermo	3.0
LATVIA			
198.5	1,510	Riga (tests)	16.0
525	572	Riga	15.0
LITHUANIA			
1,935	155	Kaunas	7.0
NORTH AFRICA			
363.3	825.3	Algiers (PTT)	16.0
416	721	Radio Maroc (Rabat)	6.0
and 32.26 m. (9,300 Kcs.)			
NORWAY			
235.5	1,274	Kristianssand	0.5
240.6	1,247	Stavanger	0.5
364	824	Bergen	1.0
367.6	816	Fredriksstad	0.8
493.4	608	Trondheim	1.2
1,083	277	Oslo	60.0
POLAND			
214.2	1,400	Warsaw (2)	1.9
235	1,283	Lodz	2.2
312.8	959	Cracow	1.5
335	896	Poznan	1.9
380.7	788	Lvov	16.0
408	734	Katowice	12.0
563	533	Wilno	16.0
1,411.8	212.5	Warsaw	120.0
PORTUGAL			
241.6	1,241.8	Oporto	0.25
282.2	1,063	Lisbon (CT1AA)	2.0
also on 31.25 m.			
ROMANIA			
391	761	Bucharest	12.0
RUSSIA			
348.8	860	Leningrad RV70	20.0
358	838	Moscow (Exp.)	15.0
385	779	Stalino (RV26)	15.0
389.6	770	Archangel	10.0
473.2	634	Sebastopol	10.0
502.4	597	Nijni Novgorod	10.0
644	465.8	Kazan (RV17)	10.0
720	416.6	Moscow (PTT)	20.0
824.2	364	Sverdlovsk RV5	50.0
849	353	Rostov (Don)	4.0
937.5	320	Kharkov (RV20)	25.0
1,000	300	Leningrad	100.0
1,032.6	290.5	Kiev	25.0
1,071.2	280	Tiflis	35.0
1,103	272	Moscow Popoff	75.0
1,171.5	256	Taschkent	25.0
1,250	240	Bakou	35.0
1,271.5	236	Minsk (RV10)	35.0
1,304	230	Moscow (Trades Unions)	165.0
also on 50 m. (6,000 Kcs.)			
1,380	217.5	Novosibirsk	100.0
1,482	203	Moscow	100.0
also on 46.0 m. (6,438 Kcs.)			
1,600	187.5	Irkutsk	15.0
SPAIN			
252.3	1,189	Barcelona (EAJ15)	8.0
267.6	1,121	Valencia	8.0
348.9	860	Barcelona (EAJ1)	8.0
363.1	825	Seville (EAJ5)	1.5
411.4	729.2	Madrid (EAJ7)	2.0
424.3	707	Madrid (España)	2.0
456.6	657	San Sebastian (EAJ8)	0.6
SWEDEN			
231	1,301	Malmö	1.25
257	1,166	Hörby	10.0
307	977	Falun	0.5
321.0	932	Göteborg	10.0
435.4	689	Stockholm	55.0
541.5	554	Sundsvall	10.0
770	389	Ostersund	0.6
1,229.5	244	Boden	0.6
1,348.3	222.2	Motala	30.0
also on 49.46 m. (6,065)			
SWITZERLAND			
244.1	1,229	Basle	0.65
245.9	1,220	Berne	0.5
403	743	Söttens	25.0
459.4	653	Beromuenster	60.0
760	395	Geneva	1.25
TURKEY			
1,200	250	Istanbul	5.0
1,538	195	Ankara	7.0
YUGOSLAVIA			
307	977	Zagreb (Agram)	0.75
430.4	697	Belgrade	2.5
574.7	522	Ljubljana	2.5

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It was on September 15, 1882, that the late Dr. Ferranti's original company was established, and the intervening fifty years has seen remarkable strides in the progress of the existing company.

Although most of us are apt to think of Ferranti in connection with such high lights of the radio industry as the AF5 transformer, we must not overlook the fact that this firm has very wide ramifications in every part of the electrical industry.

The interesting exhibition arranged at Bush House emphasises this fact, and we were able to inspect such products as Ferranti meters, including those used in the grid system, huge transformers, and instruments for household electricity supply.

Then we saw the now well-known Ferranti electric clocks for use on frequency-controlled mains supplies, Ferranti electric fires for hanging on the wall, as well as the ordinary type, and many other products.

The outstanding exhibit of the radio section is the new Ferranti seven-valve super-het band-pass console, which will undoubtedly prove to be one of the hits of the season. To sell at the low price of 22 guineas, this new set employs all the latest super-het ideas. A great deal of money must have been spent on the tools for the production of this set, which incorporates coils and condensers of great precision.

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Double Band-pass Three (SG, D, Trans) .. WM259
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Short-wave Super-het Adaptor AW329
Ether Searcher Radiogramophone motor board AW333
"A.W." Short-wave Adaptor AW339
Big H.T. Unit for A.C. Mains WM230
Loud-speaker Tone Control WM234
"W.M." Linen Diaphragm Loud-speaker .. WM235
Two-Minute Adaptor for Short Waves .. WM240
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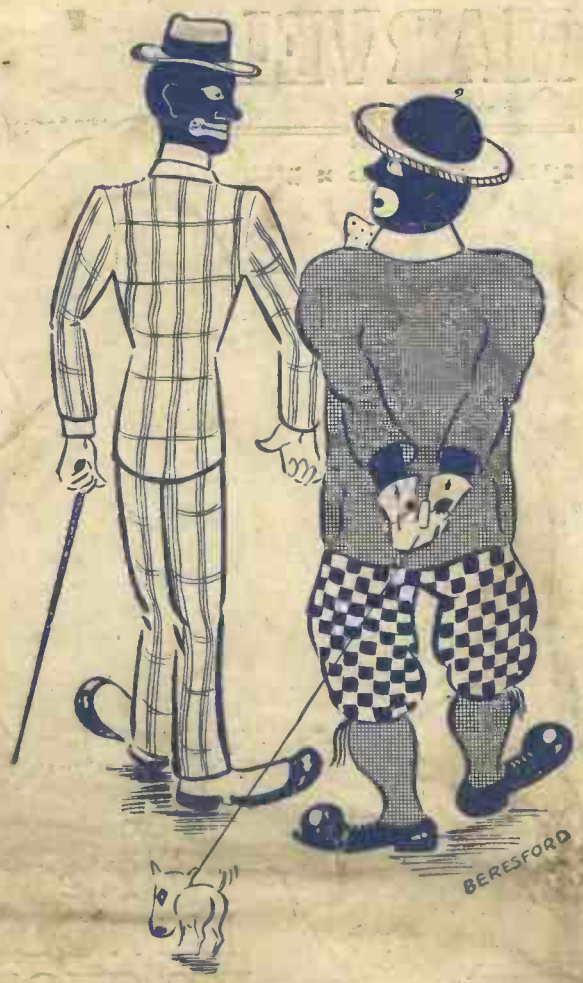

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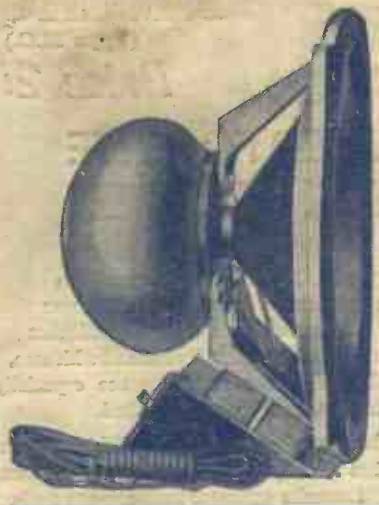

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